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GRAPHITE :

ITS FORMATION AND MANUFACTURE.*

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Early History and Recognition.

In the year 1779, Karl Wilhelm Scheele, a young apothecary in the town of Koping, Sweeden, a remarkable genius as an investigator, and then in the 37th year of his age, discovered that graphite had an individuality quite apart from molybdenum sulphide, with which it had been until then confounded. He discovered that when it was treated with nitric acid, carbon dioxide was produced, whereas molybdenum sulphide when oxidised produced a white earth, and he drew the conclusion that it must be some kind of carbon, likely of the general natural of coal.

Previous to this discovery by Scheele, a group of minerals including graphite and certain ores of lead, molyhdenum, antimony, and manganese (lead sulphide, molybdenum sulphide, antimony sulphide, manganese dioxide) were believed to be one and the same substance, or, at least, members of the same family. This opinion was due to their outward resemblence, and the fact that they produced marks on paper. This confusion naturally led to the application of the same name or names to each of the members of the group, and as graphite had not been recognised by any peculiarity distinctively its own, it received the names molbdæna, plumbago, graphite, and black-lead, which were used in an indiscriminate manner for each of the several substances. The name molybdæna was dropped at any early date, probably immediately following the discovery by Scheele, and there is no known reason why plumbago and black-lead should not have followed its lead, for graphite is the only one of the series not misleading and entirely appropriate, meaning as it does "I write," from the Greek word *graphoe*.

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Graphite does not seem to have received any particular attention from chemists from the time of the discovery hy Scheele until the year 1800. During the last quarter of the eighteenth oentuary, the diamond was the subject of much interest, in a chemical sense, and in the hands of the French chemists it was shown to produce carbon dioxide when ignited in air. In 1796 Smithson Tannant showed that equal weights of charcoal and diamond yielded equal weightsof carbon dioxide on burning and they were therafter associated together as carbon. In 1800 Mackenzie added graphite to the carbon group, by showing that it also, in equal weight, produced the same weight of carhon dioxide (Roscoe). Thus, in the opening year of the present century, graphite was proven to be an elementary substance Charcoal, diamond, graphite were then recognised as three district allotropic form of the element carbon.

Distribution.

Graphite, in a more or less pure state, is quite freely distributed over the earth, hut only in a few places is it found under conditions of purity, quantity, ease of mining, refining, and transportation to market that permit of a profitable business being made of it. Statistics for the six years 1890 to 1895, inclusive, give the world's production as 73,751, 57,220, 54,280, 55,810, 46,951 and 53,955 short tons. This is an average yearly production of 56,994 tons—over 156 tons every day of the year—of a material known to the majority of men as black-lead or plumbago, useful only for writing on paper and polishing stoves.

The production during the years mentioned was contributed to by Austria, Ceylon, Germany, Italy, United States, Canada, Japan, India, Russia, Great Britain, and Spain, the proportionate quantities furnished hy these countries being in the order given (*Mineral Industry*, 1898). It will be observed that Great Britain is, with but one exception, the sallest producer; indeed 45 tons cover the total amount reported, and this mined in 1895. For several centuries Great Britain was one of, or the largest producer; in fact, in the earliest days of the industry, it was probably the only one. The graphite from the Borrowdale mines in Cumberland was famous as the best for making pencils. In the sixteenth and seventeenth centuries these mines were so productive as to yield an annual revenue £40,000, although they were only worked a few weeks in the year for fear of exhausting them (Roscoe).

Great indifferences exist in the structure and purity of the graphites furnished from the various mines. Mother Nature was seemly not content with making carbon appear in three forms, charcoal: diamond, and graphite, hut extended her labours on graphite; and, to the further confusion of the metallurgist and the chemist, made it a family of two members, crystalline and amorphous, two district allotropic forms of the allotropic substance, graphite. The pro-

duct of the Ceylon mines is crystalline, of great purity, analysing in some instances over 99 per cent. carbon, while that of the Borrowdale mines is amorphous and also very pure.

The chief impurity in graphites iron; indeed, its constant presence and frequent large quantity led to the belief, in the early days, that graphite was a carbon-iron compound, and it was even sometimes called carburet of iron.

Uses.

It is quite probable that the first use made of graphite was an instrument for writing. The first account we have of its employment for this purpose is contained in the writings of Conrad Gessner on "Cossils," published in 1565. A picture of a pencil is shown, and, referring to it, he says:—"The pencil represented below is made for writing, of a certain kind of lead (which I am told is an artificial substance termed by some, English antimony), sharpened to a point and inserted in a wooden handle" (Roscoe). This pencil was probably made of graphite from the Borrowdale mines, which, we are told, were in operation in the sixteenth century. Its uses for other purposes than pencils are of much more recent date, probably all of them falling within the present century, and nearly all within the last few years.

The present uses of graphite include the manufacture of pencils crucibles, stove polish foundry facing, paint, mortar and dynamo bushes, antfriction compounds, electrodes for electro-metallurgical work, conducting surfaces in electro-typing, and covering the surface of powder grains. For most of these purpose it is used in the natural impure state, while for others it is necessary to render it quite pure and free from grit. Its purification is accomplished by a method worked out by Brodie, which consists in first grinding, or otherwise reducing the graphite to a state of fine subdivision, washing out the heavier impurities, mixing 14 parts with 1 part of potassium chlorate and 2 parts of concentrated sulphuric acid, heating on a water-bath for some hours, washing thoroughly and afterwards roasting at a red heat. If silica is present a treatment with hydrofluoric acid is added to the process.

The mining and manufacture of graphite into articles for which it has been found useful give employment to thousands of people. The mines of Ceylon alone, when working to their capacity, employ about 24,000 men, women, and children; the work, however, is done entirely by hand, and in a very crude manner (Watts' "Dict. of Chem.," 1890). In the city of Nuremburg, Germany, the home of the famous Faber pencil, are twenty-six factories, employing about 5,500 people in the making of pencils ("Encl. Brit.").

Manufacture.

The rapid increase in the use graphite, and consequent decrease in Nature's stocks, make the problem of manufacturing it to order a subject of much importance.

When we consider the hundreds of thousands of chemical changes men are constantly putting the elementary bodies through, and the very prominent part taken by carbon in these re-actions, it would be rather remarkable if at some point, Nature's method for producing graphite was not discovered. That it is not a very difficult act is evident from the fact that it has been accomplished, in a small way, in several instances.

Mr. Muir, in Watt's "Dictionary of Chemistsy," edition of 1890, mentions six recognised methods.

(1) By heating charcoal with molten iron, and dissolving out the iron with hydrochloric and nitric acids.

(2) By the slow decomposition of hydrocyanic acid, and boiling the product with nitric acid.

(3) By evaporating the mother-liquors obtained in making soda: these contain cyanogen compounds which are decomposed at a certain concentration of the liquid with formation of ammonia and graphite.

(4) By leading carbon monoxide over ferric oxide at 300° to 400°.

(5) By the de-composition of carbon disulphide at high temperature, in contact with metallic iron.

(6) By leading carbon tetrachloride over molten pig iron.

Whether or not any of these methods could be developed to a state providing a commercial process, I am not prepared to say, but am inclined to think not. They have always been considered accidents or chemical feats of the laboratory, and in some instances their formation was very objectionable.

The Cowles Bros., of Cleveland, O., are reported to have found that graphite sometimes occurred in or about the charge of an electric furnace. This formation is referred to in one of their patents, and a feature of the patent is a provision to get rid of the material, as it was very objectionable on account of its high electric conductivity. Its formation was not reduced to a method, the causes for, or the exact conditions under which it was made, not having been investigated. It was like some of those in the list of Muir, an accident, and a great nuisance.

Still another way of making graphite was described by G. Rose, in 1872. He exposed a cut diamond, bedded in charcoal, to a temperature equal to molten cast iron, whereupon the surface became coated with graphite. It is safe to say this process will never attain commercial success nor popularity.

Finally, in the "Encyclopædia Britanica" (1890) we are told that "by heating to the high temperature afforded by a powerful galvanic battery, both the diamond and amorphous carbon are converted into graphite." This statement I will refer to later on.

In a paper which I had the honour of presenting to the institute at its stated meeting of June 21, 1893 ("Carborundum: its History, Manufacture, and Uses"), reference was made to the formation of a black material consisting of a mixture of carborundum and free carbon during the operation of the carborundum furnaces. This was again referred to, and at much greater length, by Mr. Francis A. Fitzgerald, chemist to the Carborundum Company, in a lecture delivered before the Institute on December 11th, 1896 ("The manufacture and Development of Carborundum at Niagara Falls"), after it had been the subject of much thought and study, and when I had about concluded the formation of a theory covering the transformation of amorphous into graphitic carbon.

Very early in my experiments on the manufacture of carbonundum, I noticed that graphite occasionally formed in the portion of the furnace charge lying next to the cylinder of granular amorphous carbon which passed through the centre of the furnace and which became heated to an extremely high temperature, by the passage of a heavy electric current, and around which the charge was placed to receive the heat necessary for the formation of carborundum. Also that when ordinary bituminous coal coke was used to form the core, quite a large amount of it was converted into graphite, whereas, when petroleum coak was used, very little of it was made graphite.

By a careful study of these formations, it was found that the graphite formed outside of an surrounding the core was produced by the decomposition of the carborundum, which is chemically, a carbide of silicon, and by induction from a number of known facts, that that form within the core was also produced from a similar decomposition of carbides, which were created by the chemical union of the carbon of the core with its contained impurities. The facts from which I have drawn this conclusion are:—

1. Comparatively pure petroleum coke produces practically no graphite.

2. Impure bituminous coal coke produces large quantities.

3. The larger the known percentage of impurities in the bituminous coal coke, the greater the amount produced.

4. That only a part of the carbon of the core is converted into graphite. This not being increased, even by repeated use of the same grains, in successive carborundum furnaces.

The graphite found by the destruction of carborundum is remarkable in that it retains the form of the crystal of carborundum, from which it is, derived. It has, however, less than one-third the weight of car-

borundnm, and possess the characteristic metallic-grey colour of natural graphite; but in size and form it so closely resembles the original crystal as to be, in fact its skeleton pseudomorph in graphite. The graphite formed in the core is usually not so well defined, or distinct, as in that from carborundum, most of being disseminated through the body of the individual grains in which it is found, the amount contained in any one gain varying with the precentage of impurity originally present. In some instances the entire mass of the grain is converted into beautiful, graphyite this occuring, I think, in cases where the grain is lagely composed of slate, and it sometimes happens that one-half of the grain is completely converted, while the remainder is changed but little.

These two seemingly distinct method of producing graphite from carborundum and from coke, are in fact indentically the same; the first step in each is the formation of a carbide, the second its destruction. In making carborundum, silica and coke are mixed in the correct proportions to produce a true carbide, when heated in the electric furnace, without an excess of either constituent. In making this mixture, account is taken of the impurities contained in the coke, and the silica reduced proportionately. In the case of the core there is a natural mixture that produces a carbide from a portion of the carbon. The carbides formed under both of these conditions decompose when heated to a certain temperature above that at which they were formed.

This method of manufacturing graphite I would define as consisting in heating carbon in association wish one or more oxides, to a temperatnre sufficiently high to cause a chemical re-action between the constituents, and then continuing the heating until the combined carbon separates in the free states. It is not, however, limited to the use of oxides, as pure metals; their sulphides and other salts may be used, but for various reasons the oxides are to be preferred.

Theory of Formation

All of the methods of manufacture, thus far known; contain the same underlying fundamental principle. Each of the six methods described be Muir, as well as my own method, contain as a part of the process the expulsion or liberation of the carbon from a chemical association with one or more elements, and this occurs under conditions unfavourable to, or absolutely prohibitive of its re-association with the same or other elements. It is cast out free to take until itself such physical or other properties as, we must assume, properly belong to it in the free state, when formed under normal conditions. It has been shown by Moissan, that, when subjected to great pressure, at the moment of separation from cast-iron carbon has those distinctive characteristics that cause it to be called diamond; while Scheele shown in 1778, that the same carbon, separating from the iron without pressure, takes the graphitic form. Amorphous carbon, the third allotropic form, never occurs pure, and is invariably produced from carbor-held in chemical association with other elements, under conditions favourable to free chemical action between it and other elements.

The production of graphite by Rose's method—heating a diamond bedded in charcoal to the melting point of cast iron—is a beautiful illustration of the return of a body under strain to the form it takes under normal conditions. It will be noted that the diamond was heated to the teperature at which it is known to form, as shown by Moissan's experiments; also that it was fairly well protected from chemical action.

The statement in the "Encyclopædia Britanica" that both diamond and amorphous carbon are converted into graphite, when heated by a powerful electric current, is very commonly held—indeed I might say universally,—although Berthelot concluded from his investigations, that heat alone is without influence on carbon; that is to say, graphite is not changed to amorphous carbon, nor the amorphous to graphite, when heated to witness in an atmosphere of hydrogen or chlorine. That diamond will change to graphite, when protected from chemical influences, under the influences of high temperature is undoubtedly true, and, indeed, is what might be expected from other known facts; but that *pure* amorphous carbon will change to graphite as the simple result of heating, is not proven, and certainly it does not occur at, below, the temperature necessary for the transformation of the carbon in a carbide to graphite.

From the facts in hand I have deduced the following theory:—

1 Graphite is the form carbon assumes, when freed from chemical associations, under conditions of low pressure and protection from chemical influence.

2, Diamond is the form carbon assumes, when freed from chemical associations, under conditions of high pressure and protection from chemical influence. And, by inference,

3. Amorphous carbon is the form carbon assumes, when freed from chemical associations, under conditions of low or high pressure and exposure to chemical influence.

This theory does not, however, account for all of the observed facts, and must be supplemented by the hypothesis that catalysis occurs, under certain conditions, during the transformation of amorphous into graphatic carbon. The amount of graphite produced in the core of a carborundum furnace, and also in graphite articles I have made, is much too great to be accounted for by the theory that it is formed by the dissolution of the fixed carbides, formed by the contained impurities and carbon sufficient to satisfy the chemical formula, The most probable and satisfactory explanation is that a catalytic action occurs—a progressive formation and dissolution of carbides. The temperature being much above the point of volatilisation of silica, and all other possible impurities, a rapid dissipation of the active agents takes place, and is completed, in this case, before the conversion of all of the amorphous carbon can occur.

Commercial Manufacture.

As the result of my investigations and deductions, I think the only commercial way to make graphite is by breaking up a carbide by the action of heat. The carbon should be freed from chemical combination by what might be termed the evaporation of its associated elementary substances. I have secured patents covering this method, and these have been made the basis for the organisation of an incorporated company bearing the name "Acheson Graphite Company." The company has now under way the erection of works at Niagara Falls where necessary electrict current will be obtained from the Niagara Falls Power Company.

Several distinct forms of the product will be produced. One consists of forms or articles, made out of amorphous carbon, with the desired amount of impurity added thereto, which will afterwards be heated in an electric furnace, and converted, more or less, into graphite. I have been carrying on this line of manufacture for a year or more, using the furnaces of the Carborundum Company to produce the graphitisation, the articles having first been made by the arc-light carbon manufacturers. Over 200,000 carbon electrodes, measuring 15 inches in length, with about 1 inch cross-sectional area, were made for use in the Castner alkali process, nearly one-half of them having been shipped to Europe, to be used for this work in England and Germany. The life or efficiency of these graphitised electrodes is many times that of the same electrodes ungraphitised. I have also graphitised some tons of carbon plates, to be used in making dynamo and motor brushes, and a large variety of odd forms and sizes for divers purposes.

Another product—the one which will probably be of greatest importance—is an intimate mixture of pure amorphous carbon and graphite in fine powder. This will be put on the market for paint and foundry facing, and, as it has been formed at an extremely high temperature, it is quite pure, and posseses all of the qualities desirable for the purposes for which it is intended.

It is not the present intention of the company to enter into the manufacture of their product into finished form for the general market, but rather to encourage those who are now engaged in making up

the natural graphite into articles of commerce to become buyers of their material, substituting it for that now used.

The company's plans, now being carried out, provide for the erection of a brick-and iron building, 100 × 50 feet, on a plot of ground in Block No. 8 of the Niagara Falls Power Company's lands (adjoining the works of the Carborundum Company). Therein they will erect machinery for reducing coke to grains of the desired size, an electric furnace through which the prepared grains will pass in a continuous stream, a pulveriser for reducing the grains as received from the furnace, and a scalping sieve through which the product from the pulveriser will pass, that particles exceeding the 1/200th of an inch diameter may be removed. The final flour or powder will contain an amount of pure graphite proportionate to the percentage of impurities in the original coke. It is quite possible that, instead of using high-grade marketable coke, the fine refuse from the coke ovens—which is at present a waste material—will be utilised in the manufacture of this product.

In this connection I would call attention to the need of a specific name for the new product. *Artificial*, as applied to a product, chemically and physically indentical with that made by Nature, is not pleasing: it conveys the impression that, failing to produce the real thing, a cheap imitation, a sham, is being palmed off as the genuine article. Not even the Century Dictionary's definition of artificial, as "made or contrived by art, or by human skill and labour; opposed to Nature," is sufficient to banish this feeling; for, after all, in the particular case in hand, being ignorant of the exact methods pursued by Nature, we may be simply forcing her to reveal her methods, to the final results of which we neither add nor subtract one jot or title. The same objections may be made to the expression *Artificial Manufacture* of Graphite, for we may not be sure that the process forced upon her is not identical with that of her own selection. *Manufacture Graphite* would be quite apropriate, were it not for the fact that it is popularly applied to articles made of graphite.

It may not detract from the general interest in this subject to call attention, in closing, to the fact that graphite first shown to be an elementary body, an allotropic form of carbon, in the first year of the nineteenth century, is in this, the last year, made to order in great quantities, and that it will, before the close of the century, become an article of ordinary commerce in its new form. Perhaps it will take its place as the primitive form of carbon—the one it assumes under normal conditions.

THE EUCALYPTUS.

THE SOIL AND THE GRAFT.

The information which has been recently published in these columns on the subject of the Eucalyptus, shows that the tree may be cultivated in this country even as far north as the country of Inverness. It is indisputable, however, that the risk is always great, except perhaps in certain favourable situations, not only on account of the climate, but also for other reasons, to which reference will presently be made. The Eucalyptus at Meadfoot Rock, Torquay, which is reported to be twenty years old, must, for instance be growing under exceptionally favourable conditions, since it resisted the winter of 1894-95, when the genus was practically exterminated from the Island of Jersey. Many of the trees, moreover, had attained to a very large size, and seemed to be thoroughly acclimatised in the Island, where the average temperature is considerably higher, and the extremes of heat and cold considerably less, than in England. The question of temperature is, indeed, not the only one to be considered in the successful cultivation of the Eucalyptus and it is probably on this account that the limit of cold endurance of the tree is found in Western Europe to vary within comparatively wide limits as will be mentioned at the end of this article.

Some species are undoubtedly better adapted than others to certain soils and situations, and it should not be forgotten that in the Australian continent, which is the home of the Eucalyptus, different species thrive best under very different conditions. For instance, the spotted-gum of New South Wales, E. maculata, is generally found on stony ridges; the White-gum E. viminalis, attains to a great size in rich soil in mountain forests, but it thrives only moderately in poor soil; and the bloodwood, E. corymbosa, flourishes better in the mountains than on the coast. Some varities, again, are best adapted to the northern and warmer parts of Australia, and whilst some prefer swampy ground, others thrive best in sandy or calcareous soils.

So important, indeed, is the question of soil, that in the commercial cultivation of the Eucalyptus it is well recognised, as Professor Warren states in his work entitled *Australian Timbers*, that the strength and durability of the timber opened to a great extent upon the locality in which the trees are grown. Timber for example, of the same name, and presenting the same general characteristics, differs widely in quality when it is grown under different conditions of temperature, geological formation of soil, and amount and distribution of rainfall; or when it is grown on mountain ridges, or in swampy, low-lying ground. The Blue-gum, for instance, from a particular district of Victoria (Corner-Inlet), gives excellent results compared with the timber of the same species grown in other localities under less favourable conditions. Again the timber grown in swampy, low-lying districts is found to possess less tenacity of fibre than the product of the same tree grown at higher elevations, and in more favourable geogical formations; and the granite soils of Australia, it may be added, do not appear to produce any kind of good timber.

The Eucalyptus, moreover, is subject to a defect called gum-vein, which is caused by the extravasation of gum-resin in particular parts among the woody tissue, and where an apparent injury has been sustained; or in the concentric circles between successive layers of wood. If therefore, the Eucalyptus is so affected by local conditions in its native habitat, how much should they not be considered when the tree is grown in regions where frost is an additional, and its greatest, danger. It may be mentioned in this connection, as Senor Sempere has stated in his Monograph on the Eucalyptus, that the cultivation of the tree has been very successful in Spain, because it finds there three climatic conditions which it requires, viz., "the proper temperature, the necessary humidity, and the suitable quality of the ambient air."

The opinion of M. Felix Sahut is also of great value in this connection, inasmuch as he is one of the best authorities as regards the acclimatisation of the tree in Europe. He states that while the minimum winter temperate must first be considered, the relative atmospheric humidity and other local circumstances must not be overlooked as is indeed proved by the following circumstance. Fiftythree species of Eucalyptus were growing near Monttellier in the winter of 1864, when the temperature fell to 10.4o F., which completely destroyed twenty-eight species nine others being more or less injured, whilst sixteen completely resisted the cold. Moreover, other experiments made under different local conditions, showed that some of these species, in certain cases, withstood lower temperatures while under other conditions they suffered more when the cold was not so severe. It has also been found that several of the species which most successfully resist the winters in the south of France are unable to exist in the soil of Provence. M. Sahut gives a very remarkable account of an Eucalyptus which, planted at Lattes in 1864, resisted 32o F. of frost during the memorable winter of 1870-71 nor did the tree suffer in any way, and even its leaves remained intact. It had been raised from a seedling among seed of E. Risdoni, and its identity was never traced. It grew to a height of nearly 40 feet during its comparatively short life, for at the age of twenty years it gradually began to show signs of weakness and ultimately it died. This tree which had been provisionally named E. lattensis by M. Naudin, indicated a species possessing cold-resisting qualities but as it never blossomed; M. Sahut's foresight le

him to draft it on an allied species with a view to its cultivation as an ornamental tree in more northern parts of France. Two methods were employed: one the cleft graft with moderate results only; and the graft by approach, or in arching, with much greater success. The stock being more susceptible to cold than the scion, the opperation was purposely made as near as possible to the root. The nion of the plants was practically perfect, and five or six dozen plants developed vigorously and with great promise. Some of them grew to a height of 6 feet during the first year, but during the next season they all began to fail, and at the end of the third year not one was alive.

The operation of budding was not tried by M. Sahnt in these experiments, because he did not think it would succeed, and it is interesting to note that this method has been adopted with good resnlts elsewhere. The *Revue Horticole* published in 1893 an account of work of this character conducted in Palestine by M. Justin Dugourd, who budded E. Globulus on E. resinifera. The former variety is one with spreading roots, and is less resistant to the influence of the wind, &c., than the latter, which was used as the stock, because it grows into a strong tree. It appears to be necessary for the complete success of this operation to support the scion in some suitable manner, so that the sap may the more readily reach it. As the stock increases in growth. It is also desirable to remove any shoots which it may produce, unless the operation is unsuccessful, when the subject may then be allowed to grow. It should be mentioned that M. Sahut is of opinion that the E. Resinifera in question is the popular but incorrect name given by many French gardeners to a variety of E. rostrata, which is very generally found in the south of France, where it thrives best in the calcareons soils, and is more resistant to drought than many other kinds.

Considered in the light of past results in connection with other plants, M. Sahut is of opinion that the graft may be the means of greatly extending the cultivation of the Eucalyptus in Europe. He himself has proved that certain rare species of Pinus will not grow in a particular limestone district, except when grafted on P. halepensis, or P. nigra, or P. pinea. To quote M. Sahut verbally from his paper on the subject, in the *Annales de la Societe d' Horticulture de l' Herault*, the problem is as follows: "Given one or several species of Eucalyptus which develop vigorously in a certain soil, it is required to employ them as stocks whereon to graft species which will not themselves thrive threin." And he illustrates his proposition by the following evidence: Of the 1:0 species of Eucalyptus experimentally grown at Lattes the larger proportion were killed by the cold, others succumbed to the heat, while yet others, after languishing for several years ultimately perished not on account of the cold but because the nature of the soil was unsuitable and different from the mountain regions of Australia whence the trees originally came.

As regards the l mit of cold enduarance of the Eucalyptus it may be added that, with a view to the cultivation of the tree in America, the United States Government made an inquiry on the Subject through its consular service in the year 1894, and the reports received from various parts of the world are of very great interest. The officer at Marseilles reported that, generally speaking, some species which have been thoroughly acclimatised in southern Europe are capable of resisting a temperature as low as 8·6° F., but successful cultivation of desirable sorts cannot be hoped for in localities where the winter maximum of cold exceeds 21·2o to, 17·6o F.

The report from Rome statect he Eucalyptusis killed by the cold in Italy when the thermometer marks 12° F. below Freezing. The consul at Madrid, writing in March, 1894, stated that E. Globulus and other allied species had resisted the climate of Barcelona and Madrid, where the temperature is frequently as low as 6o or 7o C. (20. 7o F.), without any diminution in vigour or vitality.

The consul at Zanzibar reported that an attempt had been made to cultivate the tree in his district but without success, owing to want of care or to the unsuitablity of the soil.

Further evidence could be given to show that the experimental cultivation of Gum-trees must be regulated by a consideration of various factors other than the temperature of the district. It may be added for instance, that in the Punjab, planting in groves gives a better chance of success than when the tree is planted singly along the roadsides, and that its general failure in that district is mainly attributable to three causes, viz, failure of the rains; injury to the young stems by sunburn; but principally to the white ants, which destroy the roots.

It may be interesting in conclusion, to give the following information from a comparatively recent Spanish work on horticulture.* E. Globulus is the favourite variety in Spain, where it thrives in humid soil, but not in humid air; E. resinifera is found to resist the wind remarkably well, and to accommodate itself to every soil; E. urnigera is suited to the mountainous districts and to low temperatures; E. Gunni and E. coriaceia are indifferent to cold; E. marginata is rather sensitive; E. amygdalina grows best in sandy soil, E. fissilis prospers in poor soil, E. odorata thrives in dry soil.

In Bois' *Dictionnaire d' Horticulture*, the following species are mentioned as extensively grown in Provence, and to be as rustic as E. Globulus:—E. calophylla, E. cornuta, E. Gomphocephala, E. robusta; and E. Gunni, E. polyanthema, and E. viminalis, which are also specially named as among the most hardy of the species.

A large number of species have been experimentally planted in the Landes of the southwest of France with unsuccessful results; and in the region of Paris the tree is taken to the temperate-house as early as the month of November. Hence, M. Bouquet de la Grye defines the northern limit of the Eucalyptus in Europe to be the same as that of the Orange—a statement with which many growers do not agree, and which is not unlikely to be disproved by cultivation of the tree under the selective conditions to which allusion has here been made. *Scion.*

EARLY ATTEMPTS TO CULTIVATE TEA IN ENGLAND.

I send you the following extracts from a book on the History of Tea, in Old English, by John Coakby Lettsom, M.D., London, printed by J. Nichols for Charles Dilly. First edition 1772; New edition, 1779.

It is a very interesting book with nice illustrations. It seems some attempts were made to cultivate the tea plant in gardens in England and in some colonies. The work also contains very valuable and curious information about the natural history of tea, and the rise and progress of tea consumption not only in England, but throughout the continent of Europe, in the seventeenth and eighteenth centuries. Here are a few of the extracts:—

"Within these three or four years we have been successful enough to introduce into this kingdom a few genuine tea plants. There was formerly, I am told a very large one in England, the property of an East Indian Captain, who kept it some years, and refused to part with either cuttings or layers. This died and there was not another left in the kingdom. A large plant was not long since in the possession of the great Linnæus, but, I am informed, it is now dead. I know several gentlemen who have spared neither pains nor expense to procure this evergreen from China; but their best endeavours have, in general, proved nusuccessful, for, though many strong and good plants were shipped at Canton, and all possible care taken of them during the voyage, yet they soon grew sickly, and but one, till of late, survived the passage to England."

"The largest tea plant in this kingdom is, I believe, at Kew; it was presented to that royal luminary by

* *Novisima Guia del Hortelano Jardinero y Arbolista.*

John Ellis, Esq., who raised it from the seed. But the plant at Lion House, belonging to the Duke of Northumberland, is the first that ever flowered in Europe, and an elegant drawing has been taken from it in that state, with its botanical description. The engraver has done justice to his original drawing, which is now in the possession of that great promoter of natural history, Dr. Fothergill, to whom I have been indebted for many dried specimens and flowers of the tea tree from China. * * * "

"Among several hundred specimens of dried tea flowers that I have examined, scarcely one in twenty was perfect. Some had three petals only, some nine, and others the several intermediate numbers. The greatest number consisted of six large petals, and externally three lesser ones of the same form. But the flowers which blossomed on the tea plant belonging to the Duke of Northumberland, from which this description is taken, consisted in general of six petals. One of the flowers indeed appeared to have eight petals; however, the numbers in the flowers in most plants vary considerably, which may account for the mistake of Dr. Hill and Professor Linnæus (who described this plant on Dr. Hill's authority), who make the green and bohea tea two distinct species, giving nine petals to the former and six to the latter. * * * "

"The best tea grows in a mild temperate climate; the country about Nankin producing better tea than either Pekin or Canton, between which places it is situated. It has been asserted that no tea plants have yet died in England through excess of cold, but the contrary, I know, has happened. The plant in the Princess Dowager's garden at Kew flourished under glass windows with the natural heat of the sun, as now do those at Mile-end, in the possession of the intelligent botanist, J. Gordon. The tea plant belonging to Dr. Fothergill thrives in his garden at Upton, exposed to the open air, and the plant introduced into the Botanic garden at Chelsea had one leaf which measured five inches and-a quarter in length. * * * "

"The bohea tea trees, now introduced into many botanic gardens near London; exhibit very obvious varieties. The leaves are of a deeper green colour, and so deeply serrated, the stalk is usually of a darker colour, and the whole shrub appears less luxuriant than that represented in the annexed plate of the bohea tea; but the botanical characters are the same. * * * "

"Father Labot next thought he had discovered the real tea plant in Martinico, agreeing, he says, in all respects with the China sort. He pretends also to have procured tea seeds from the East Indies and to have raised the plant in America; but, from his own account, this supposed tea appears to be only a species of Lysimachia, or what is called West India tea. Many other pretended discoveries of the Oriental Tea tree have been related, all of which have proved erroneous when properly enquired into. The genus of plant, called by Kaempfer Tfubakki, has the nearest resemblance to it. The leaves of several European herbs have been used at different times as substitutes for tea, either from some similarity in the shape of the leaves or in the taste and flavour; among these, two or three species of Veronica are particularly recommended, besides the leaves of sage, myrtle, betony, sloe, agrimony, wild rose, and many others. Whether any of these are really more salutary or not, is undetermined; and we now find that from the place to the cottage every other substitute has yielded to the genuine Asiatic tea. * * * "

"Many attempts to introduced the tea tree into Europe have proved unsuccessful, owing to the bad state of the seeds when first procured, or to a want of judgement in preserving them long enough in a state capable of vegetation. If this complaint arise from the first cause, future precautions about such seeds will be in vain. It is therefore necessary to procure fresh, sound, ripe seeds, white, plump, and moist internally. Two methods of preserving the seeds have put us in possession of a few young plants of the true tea tree of China: one is by enclosing the seeds in bees' wax, after they have been well dried in the sun; and the other, by putting them, included in their pods or capsules, into very close cannisters of tin and tutenague."

"See directions for bringing over seeds and plants from the East Indies, by J. Ellis, F.R.S., etc., in which particular directions are given, both to choose the proper seeds and to preserve them in the best manner for vegetation. See also the Naturalists' and Travellers' Companion, containing instructions for discovering and preserving objects of Natural History, Section III. We may observe here that the best method of bringing over the parts of flowers entire is to put them in bottles of spirits of wine, good rum, first runnings, or brandy."

"Most of the plants now in England were procured by these means; and though many of the seedlings will die, yet by this kind of management we may probably succeed in bringing over the curious vegetable productions of China, of which they have an amazing treasure, both in respect to use, show, and variety. If young plants could be procured in China, they might be sent over in a growing state in some of these boxes. * * * "

"The young tea plants in the gardens about London thrive very well in the green-houses in winter, and some bear the open air in summer. The leaves of many of them are from one to three inches long, not without a fine deep verdure; and the young shoots are succulent. It is therefore probable that in a few years many layers may be procured from them, and the number of plants considerably increased thereby. * * * "

"It may not be improper to observe here that many exotic vegetables, like human constitutions, require a certain period before they become naturalized to a change of climate. Many plants, which on their first introduction, would not bear our winters without shelter, now endure our harder frosts. The beautiful Magnolia, among several others, is a proof of this observation, and we have already taken notice (Section V) that the degree of cold at Pekin sometimes exceeds ours. We have hence reason to expect that the tea tree may in a few years be capable of bearing our climate, or at least that of our colonies; at length thrive as if indigenous to the soil; and, were labour cheaper, become an article of export, like the common potato, for which we are indebted to America or Spain. It is, however, better suited, for the climates of the Southern parts of Europe and America; but hitherto it has not been cultivated in an extensive manner in either of these quarters of the world, nor is it likely ever to be, whilst it can be procured from Asia at the present reduced price. It was introduced into Georgia about the year 1770. Hence the ingenious author of Onabi (Mrs. Morton) in her recent peom of Beavehill, in describing the products of this province, introduces the exotic of China:—

Yet round these shores prolific plenty twines,
Stores the thick field, and swells the clustering vines,
A thousand groves their glossy leaves unfold,
Where the rich orange rolls its ruddy gold,
China's green shrub, divine Magnolia's bloom,
With mingling odours fling their high perfume.

"It is indeed probable that the North American summers, in the same latitude with Pekin, would suit this tree better than ours, for, in China and some parts of North America, the heat in summer is such that vegetables make quicker and more early shoots, whereby they have time to acquire sufficient strength and firmness before the winter commances; but, in England, the tender shoots are pushed forth late, and winter soon after succeeding, they often perish in a degree of cold much less severe than at Pekin, or in colder latitudes of North America."—*Indian Planter.*

M. H. M.

AMERICAN FIBRE PLANTS.

Mr. G. E. Walsh, writing in the *Scientific American*, says:—Commercially there are 30 or 40 species of fibre plants found throughout the world, but botanically there are over 1,000 species the fibre of which can be made more or less useful in the arts and industries.

In view of the territorial changes produced by the war, the fibre industry is of peculiar interest to the farming and manufacturing world. The Islands affected by the war are all noted for the fibre plants raised on them; and taken together—that is, Porto Rico, Cuba, and the Philippines—they produce a large bulk of the best plants, except cotton, used in a commercial and manufacturing way for their fibre. Manilla hemp has long been familiar wherever cultivation exists; sisal hemp comes from Cuba, in times of peace, as largely as from Yucatan or the Bahamas; Cuba bast is essential to the millinery trade of the world; and Sunn hemp and cebu hemp are but trade varieties that come from the same islands.

The Philippines, in particular, are rich in fibre plants, with possibilities for development and expansion scarcely conceivable. Throughout the archipelago, it is estimated, all the fibre used in the manufacturing world could be produced at a cost that would annihilate similar industries anywhere else in the East. This is not entirely true, however, for neither cotton nor flax could ever find a foothold in the Philippines to compete with the United States. Our cotton is already seeking Eastern markets in ever increasing proportions and great prospects are anticipated for this trade. But in turn we must secure our hemp and jute, and other fibre-mateiral, from the lands where they best grow.

There are over thirty species of fibre plants that can be raised in this country, but most of them are unimportant in the commercial world, and most of the others thrive only very indifferently in the United States. Should we, however, extend our colonial possessions, so that in time they included Cuba and the Phillippine Islands, as well as Porto Rico, we would be the greatest fibre producing country on the globe.

At present the leading vegetable fibre that is imported into the United States, according to satistics of 1897, is sisal grass. Most of this sisal grass comes to us from Cuba, Yucatan, and the Bahamas. Attempts have been made to introduce its culture in Florida, and with some success; but its superior growth in its native islands, and their close proximity to the United States, will for ever preclude it from becoming an important industry here.

Next to sisal grass comes Manilla hemp in commercial importance. The imports of this amount to nearly $4,000,000 annually. This hemp has also been experimented with in this country, and in other lands, but the world's trade will always look for its main supply to the islands of the East, where it flourishes as naturally as cotton does in our Southern States. It can be produced and shipped to this country cheaper than our farmers can raise it at home. Cebu hemp comes from the Philippine Islands also, and is merely a trade variety that has its useful purpose in the manufactures.

Jute and "jute butts" stand third on the list of imported fibre plants. Jute comes from a variety of countries. Originally India controlled the trade in jute, but the West Indies and Cuba have entered the market in competition with her, and they are lusty rivals that cannot be ignored. The possibilities of Cuba in this line are only partly appreciated, for rebellions and wars have so long agitated the island, that little experiment has been made in anything outside of sugar and tobacco-growing.

Since 1890 the Department of Agriculture has been engaged in making experiments with fibre plants in various parts of the country, and farmers have been encouraged to grow certain fibre plants for manufacturing purpose. Nearly all the commercial fibre plants have been tested by the Department experts, and some of them have been recommended for general culture. This movement, started seven or eight years ago, has not exactly proved all that the inaugurators of it anticipated. Ramie has been raised to some extent in Florida; sisal-hemp from Yucatan has been established in a limited way in parts of the same State, and a little impetus has been given to the rejuvenation of flax culture—one of the oldest agricultural products in this country. Great efforts have also been made to utilise some of the plants that grow naturally here for fibre manufacturing. Thus the palmetto fibre and vegetable hair of the Spanish moss growing on the trees of the Southern States have found some use that makes the product of fair value. Several of the leading varieties of palms in Florida have been cultivated for the fibre in their stalks and leaves, and the palmettoes have been utilised for making brushes and brooms. Jute culture has been extended, so that we produce annually a fair crop. Yet this weed is natural to this country, and some varieties are the finest and best grown in the world.

It is possible to double the annual production of fibre plants in the United States, and thus increase the manufactures; but the history of many of our agricultural products hardly warrents one in predicting that we can raise successfully most of the fibre plants needed in this land. The flax industry was at one time an important industry in New England; but it has steadily declined for half a century now, because farmers could put their land to more profitable use in raising other crops. No amount of push and energy has ever been able to renew this industry, although spasmodic efforts have frequently been attempted. There was plenty of land in the world where flax throve better than in the United States, and it could be cultivated cheaper there than in this country.

Likewise the hemp industry in the South has been declining ever since 1870. It flourished and expanded in the early sixties, and just prior to the rebellion it was an important industry, promising in time to rank second only to cotton. But sisal and Manila hemp appeared in the market, and the Southern hemp could not compete with them. Our hemp lost its position in the manufacturing world, and sisal and manila were soon used in its place. No amount of study and experiment could rejuvenate the decadent industry.

While there are undoubtedly many native fibre plants growing in this country that will be found useful in many industries, it will be impossible to make them compete with the low-priced fibres that come from many of the tropical and semi-tropical islands. Nor shall we ever be able to introduce these foreign plants into this country, so that their culture will prove successful enough to supply us with the raw material for all of our manufactures. The world will still look to the Philippines, the West Indies, Cuba, Central America, and China and India for the fibre plants that supply material for cheap clothing, bagging, rope, and similar products.

In the islands that have been acquired from Spain however, we have the soil and climate to produce all the fibre plants that are lacking in this country. Their resources in this respect are so great that they could soon supply the world with all the raw material used for cheap textile goods, cordage, nets, and kindred necessities. In Porto Rico alone we could raise successfully a dozen of the leading fibre plants, while in Cuba and the Philippines there are many peculiar only to those islands.—*Journal of the Society of Arts.*

THE EUCALYPTUS GLOBULUS.

As a good deal has recently been written on this tree, perhaps I may be permitted to record my little experience regarding the same. When at Lucknow, I used to receive seeds of various kinds of Eucalyptus from the late Baron von Mueller. Of course, the E. Globulus was among them. I raised several plants of the latter, and planted a row of them. They made rapid progress, and in a few years gained the

height of between 20 and 30 feet, with a thick stem in proportion.

I began to be proud of having introduced this wonderful tree, which then had the reputation of draining marshes. Well, one monsoon came with torential rains, and every one of my beautiful E. Globulus died from too much water at the roots, and an atmosphere saturated with moisture. I began then to be sceptical about the supposed properties of this fast-growing tree of draining marshy land.

The only variety which I succeeded in growing was the E. citriodora, which, when it sheds its bark, leaves the stem as white as snow. It flowered and seeded; but I do not know what the result was after I left.

On another occasion I landed at Naples from Bombay in January. It was snowing, and the pools round the fountains were hard frozen—a very unusual occurrence in that latitude. On my way from Naples to Rome I saw a number of large Eucalyptus-trees—presumably E. Globulus—killed by frost.

The only place in India where I saw the Eucalyptus Globulus thrive was on the Nilgherry Hills at Ootacamund. The frost there is very slight, and occurs only on the highest ridges: and the drainage on the hill slopes is very good. It was a beautiful sight to see a hill-side covered with the young blue trees. The only use they make of the tree there is for firewood. As to the Eucalyptus-oil, a lady in London told me that when she caught a cold, she rubbed a little of this oil round her mouth and nose, and the cold was scared away. I thought I would try this wonderful oil the first time I caught a cold. I had not long to wait; and one night I rubbed some as directed, and got into bed. In a very short time my fact felt as if it were on fire. I had to jump out of bed and put my face in a basin of cold water, when I got some peace!

A friend of scientific culture assures me that in the City there is an insurance company who employ a large number of clerks. During an epidemic of influenza, the porter was instructed to go round and drop Eucalyptus-oil on the blotting-pad of each clerk, and my friend asserts that not one of those clerks got influenza. They were all the time inhaling an atmosphere containing the essential oil of Eucalyptus. Such a thing, it would seem, might easily be verified. I am not aware, however, that any scientific investigation has ever been made of the properties of this oil. When a new drug is introduced, the sellers of it exaggerate its curative properties to such an extent that it soon falls into discredit and neglect. There are few things in Nature that have not some use.

The history of the metal "thorium" is a lesson. It was very rare, and was thought to be very useless. Now, however, as Thoria, it is used everywhere for incandescent lights. The demand for this metal caused geologists and chemists to search for it, and it was found that, after all, it was not so very rare. When a thing is pronounced useless, it means that no use for it has yet been discovered.

In an article in the *Gardeners' Chronicle* on "Rome," it was stated that the Trappists near Rome can now live where, before they planted Eucalypti, they could not live. In the *National Review* for February, 1899, in an article on the "Rule of the Chartered Company," by H. C. Thomson, p. 901, this is stated:—"Look at Tasmania . . . with a glorious climate, in which it is difficult to feel ill, with Eucalyptus forests in which fever cannot exist," &c. Now is all this true, or is it mere hearsay? If Tasmania has such a glorious climate, why should the non-existence of fever be attributed to Eucalyptus forests.

Then in the *Standard* of February 14, 1899, it is stated that "Influenza has made its appearance again . . . and alike in church and on 'Change the odour of Eucalyptus is significantly perceptible."

Rightly or wrongly, many people evidently believe in the property of Eucalyptus oil of staving off influenza. Investigators of the future will have to find out what is true and what is not true, not only in this, but in many other things. In a butcher's shop I saw a miserable-looking plant of E. Globulus in a pot. I asked why he kept it there? He said, "It keeps away flies." I thought I would try the experiment in my room, where flies abound in summer. I cut some branches off a blue Gum-tree I have, and placed them in a jug of water on the mantelpiece. Lo and behold, that very same evening there was a fly on the wall a few inches above the Eucalyptus leaves, and I have been told that flies have been seen to actually settle on its leaves! *E. Bonavia, M. D.*

OIL ENGINES AND TEA MANUFACTURE.

Sir,—In reply to Mr. Turbervill's query *re* oil engines and the cost per lb. made tea, "Petrol" only has vouchsafed an answer, but I do not wholly agree with him. I contend the cost per lb. made tea would (relatively speaking) rather depend upon the consumption of oil by the engine per H.-P per hour, viz. of an engine consuming one pint of oil per H.-P. per hour and that using only half pint per H.-P. per hour—than the outturn of made tea per hour (as per "Petrol') as this could be obviated by having two smaller sized engines of, say, 12 and 8 H.-P. instead of one 20 H.-P. engine, excess of power in one engine being economy on the wrong side wastage of power meaning the same in oil—hence an enhanced cost. Taking a six months' working, I find that oil has cost me ·*96 cents per lb. of made tea,* This includes transport of oil, &c., &c., and minus the rebate at 25 cents per gallon. (This is what Mr. Turbevill wants to get at.) The engine in use being a 17 H. P. Campbell's, and using one pint per H. P. per hour, and the consumption of oil being about 1.38 gallon per hour, my contention may be easily seen. Using an engine consuming only half pint per H.P. per hour, I should imagine 70 cents per lb. would be a safe figure for and estimate of cost.—Yours, &c.

W. R. SHELTON AGAR.

Mount Temple, Gampola, July 12th.

II.

Sir.—*Re* oil and oil engines and the information asked for by your correspondent, the cost per pound of tea must depend a good deal on the yield daily. But, taking a busy month, in my small factory, with an 8 H.-P. Tangye engine working a Davidson large sirocco down-draft, a large roller, and two small rollers, and sifter and roll-breaker, my made tea was over 18,000 lb., and the oil consumed, "Russian"—which is much inferior to American"—was 46 tins, or 23 cases, which cost me on the estate R5 per case. So We get R 115—say 11,500 cents for 1800 lb. of tea. I could have made more for the same money. Of course, when the yield is small, the cost is comparatively greater—for instance, to make 103,000 lb. of tea has cost me R1,124. Your correspondent will find oil a cheap motor-power provided the cost of the oil is not excessive.—Yours, &c.,

H. DRUMMOND DEANE.

Stagbrook, Peermaad, Travancore, July 10th.
—"*Local Times.*"

Vanilla Culture in Tahiti.—The increase of Vanilla culture in Tahiti is said to be spreading rapidly; the natives, with few exceptions, are giving their whole attention to the growth of the plant, and curing of the pods. Its export, which in 1893 was 29,858 lb., valued at £3,938, reached during 1898 to 92,137 lb., but owing to a serious decline in its market value, that quantity realised only £20,468, as against £35,862 for 75,740 lb. in 1897.—*Planting Opinion.*

INDIARUBBER OR CAOUTCHOUC.

ITS ORIGIN, COLLECTION AND PREPARATION FOR THE MARKET.

THE LATEST PERADENIYA "CIRCULAR" WITH MR. PARKIN'S REPORT.

Such is the subject of a Circular just issued from the Government Printing Press, and received by us from Peradeniya, giving the results of the investigations of Mr. J. Parkin, M.A., of Trinity College, Cambridge, as carried on at the Peradeniya Gardens, with General Remarks by Mr. Willis, Director of the Gardens. "Prodigious" was our first exclamation on seeing this "Circular," and yet it by no means contains the complete results of Mr. Parkin's work which will be published at home. Still it certainly includes more than enough to satisfy the most exigent of Ceylon rubber planters, and the report reaches us just in time to be included in our "INDIARUBBER PLANTERS' MANUAL" due from the press at an early date. There is, of course, in the 60 pages before us, a great deal that is of scientific, rather than practical, interest; and we cannot help suspecting that the recent discoveries in Central America and Trinidad by Mr. Biffen, Mr. Hart and others may have interfered to some extent with the practical value of Mr. Parkin's patient and truly scientific investigation. At the same time the fullest justice is done to Mr. Biffen in prominently referring to his valuable work; while the paper in the *Tropical Agriculturist* of December last (taken from the "India-rubber World") to which we made pointed reference some weeks back, is also specially referred to and quoted (on page 118) as showing that the Castilloas growing in Trinidad seem to possess proper caoutchouc in their young stems, and this would, apparently, mark them out as a different species from the Castilloas of Ceylon. But clearly, further investigation and experiment are required to settle this very important point, and we have also to continue to watch very closely the outcome of Mr. Biffen's discovery in Central America, and of Mr. Hart's continuous experiments in Trinidad.

Meantime to revert to the Circular before us: it opens after a few lines of introduction with an explanation of the measurements and contractions used; and then Mr. Parkin's paper comes under the following heads:—

A.—Botanical.

B.—The Extraction of Latex. I.—Incision (1) Kind of Incision; (2) Instrument to Use; II.—Collection of Latex from Incisions; III.—Area of Trunk to be Tapped; IV.—Effect of Wounding on Flow of Latex.

C.—The Preparation of Commercial Rubber from the Latex. (1) Hevea; (2) Castilloa; (3) Manihot.

D.—Yield.

E.—Notes on other Caoutchouc-yielding Plants.

The "botanical" chapter covers some eight pages and notices, among other things, the possible successful manufacture of "artificial caoutchouc" though no one has, as yet, got beyond the stage of laboratory experiments. The great inducement to plant rubber-yielding trees at a time when raw rubber of good quality is selling at 4s a lb., is noticed, as also Mr. Biffen's special investigations in tropical America resulting in preparations from the milk with a loss in manufacture of less than one per cent. The problems which Mr. Parkin put before himself are thus given:—

> We want to know the trees which promise best for cultivation, both as regards quality and yield of rubber. We have to consider the best times and means of tapping them, and then of preparing the rubber from the collected milk.

We find special reference made more than once to *Alstonia scholaris* as "possessing copious latex (milky juice) in its trunk." This is not an uncommon tree in our low-country, and it ought at once, we think, to be exploited. One of the finest specimens in Colombo is near the Turret Road gate of Canella Villa, its trunk being covered with the "Colombo Agent" and other well-known creepers. In closing his botanical chapter, Mr. Parkin makes the following significant remark:

> Personally I am not inclined to look upon latex as playing an important part in nutrition, and should imagine that if it were possible to extract all the latex from such a tree as *Hevea brasiliensis* without greatly injuring the other tissues, it would not be seriously harmed. I am inclined to regard the laticiferous system more as channels for holding water in reserve to be called upon during times of drought or during the dry season

We come next to the "extraction of the latex," and here we have a large number of rubber-yielding trees specified, with the different modes of extracting the caoutchouc, and special mention of certain new African kinds with thick underground stems full of latex, which Dr. Morris suggests might, if cultivated, give early returns. These are *Carpodinus lanceolatus* and *Clitandra henriquesiana*. Then comes an important statement:—

> The only other parts of the plant besides the trunk and main branches of such trees as Castilloa or Hevea, which might be used for the extraction of rubber, are the young shoots. If these could be used profitably, then a return on the capital could be obtained in a year, either by growing crops of seedlings or by coppicing permanent plants. Our attention has been applied to this with, however, no encouraging results.
>
> *Hevea brasiliensis* will not answer at all, as far as our experience goes.

Now, here is where notice is taken of the different results obtained from young stems of Castilloa in Trinidad as fully related in our *T.A.* for December and March last and subsequent numbers. Finally, Mr. Parkin says:—

> In our opinion it seems hardly likely, at any rate as far as Ceylon is concerned, that rubber can be extracted profitably from the leaves, twigs, &c., so we must return to the consideration of the main stem and consider the best means of extracting the latex from this.

But we suspect this is arriving at a premature conclusion, and we cannot see why eventually Ceylon should not do as well in this way as Trinidad. Mr. Parkin next proceeds to consider, in great detail, the best kind of incision. the best instrument, the collection of the latex from the incisions, the area of the trunk to be tapped and the results of experiments made at Henaratgoda in March last. All through here he is deal-

ing with the Hevea or Para, and we may quote the concluding statement:—

The reason why the base of the trunk should yield so much more latex has, I think, something to do with the thicker and softer bark at this region. This peculiarity has not been only observed in Ceylon. In Colonel W. J. Seaton's report on the Para rubber trees of Tenasserim, Burmah, dated January 28, 1889, he remarks: "It was observed that the exudation of milk was greatest near the ground, where the bark was thickest, while at a height of six or seven feet it was almost *nil*."

MR. PARKIN next, takes up the Castilloa tree as grown in Ceylon, and gives the results of his experiments as to the outflow of the latex. Further on, we have "the effect of wounding on the flow of the latex," with a further series of experiments in tapping, extending up to June 6th last. We do not give the details and results, because as we reproduce the Circular in full in our monthly periodical as well as Manual, planters specially interested can carefully study it there. Suffice to say that the result seems satisfactory, although in conclusion we are told:—

Probably it will be found that under some conditions it is best to tap daily, while under others it is best to tap at intervals of two, three, four, seven, or even ten or twelve days. A large number of experiments on different methods of tapping have been made and are still being made in the Botanic Gardens, and their results will be published later. Those planters who are beginning to tap their trees might well repeat some of the experiments described above on a larger scale. The success or failure of the cultivation depends chiefly on the yield of milk, and it has been clearly shown that this is extraordinarily different in different trees of the same size and age, and that it may be enormously affected by different methods of treatment. Each man must find out for himself the method absolutely best suited to his trees, in the light of the above observations and of his own and those of other workers.

We now come to "the preparation of Commercial Rubber from the extracted latex," and we read:—

The two chief points with respect to the preparation of commercial rubber are to have it free from moisture and putrefaction. The first can be effected by drying the rubber particles in thin sheets; the second by either removing the proteid matter or by the addition of some antiseptic substance which prevents the growth of bacteria and mould.

And again:—

Considering that the caoutchouc in latex exists in the form of minute globules suspended in a fluid, and that they are lighter than water, it is rather surprising that no one till now has thought of the idea of separating the caoutchouc and so preparing rubber by centrifugal force, such as is used for separating the butter fat of milk. The credit of applying the idea is due to Mr. Biffen of Cambridge University, who, in connection with Mr. Erme Howard, recently undertook an expedition through the rubber-producing districts of America. With a modified centrifugal milk-tester they tested the possibility of extracting the caoutchouc from several latices with great success.

Then experiments made by Mr. Drieberg at the Agricultural School with a cream-separator are referred to; but sufficient speed could not be got to operate successfully. Next:—

In connection with Mr. Biffen's discovery a company has been formed and a large tract of land laid down in Mexico in Castilloa, with the purpose of producing commercial rubber by centrifugalisation. A patent has been taken out on the machine, and consequently it remains to be seen at what price it will be put on the market. It may be somewhat prohibitive. In the meantime, let us consider what other means there are for preparing good rubber from the latex of Hevea and Castilloa.

Accordingly we are told of "Coagulation by acetic acid," "Extraction of Caoutchouc by means of Mercuric Chloride (corrosive sublimate)". Next we have the effect in dealing with "Castilloa," and again we are reminded that our Ceylon species "Markhamiana" probably differs from "C. elastica" in the properties of its latex; but on the whole greater success was attained than in the case of Para. Nor is the Ceara to be despised, since we read:—

Manihot Glaziovii (Ceara Rubber Tree).—This latex has been shown by Biffen to be also capable of yielding its rubber by centrifugalisation, as well as by churning.

Finally, we come to the "yield," and we are told "there is a great individual difference in the trees in the yield per incision. Out of the 32 trees of "Para" at Peradeniya, two flow much better than any of the rest without any apparent reason. Six times the largest quantity of latex got from a Hevea in a single incision, has been got from a Castilloa rubber tree. (It is extraordinary how a prejudice could have been formed some years ago against the cultivation of Castilloa trees in Ceylon!) On the other hand, however, the Castilloa latex, as a rule, contains only about half the percentage of caoutchouc that than of Hevea does. And the results of experiments are summed up as follows after giving details of tapping of Castilloa trees at Henaratgoda at the beginning of March:—

What time should elapse before the trees flowed as well again, has not yet been ascertained. Perhaps the trees would not be worth tapping more than twice a year. In that case the yield of rubber per tree per year from a trunk 3 ft. in girth and 12 ft. in length would come to about 300 grams or 10¾ oz., a small amount compared to the results stated for its native country. In fact, the weight of rubber, would not be much greater than from Heveas of corresponding size tapped ten to twelve times in the year, but the expense of extraction would be very much less. Further experiments in tappings—both in Government Gardens and on private plantations—are clearly necessary. We are promised a note of results from the Kalutara district.

In his last chapter Mr. Parkin gives us some notes on other rubber-yielding trees growing at Peradeniya and Heneratgoda, none of which, except the African *Landolphias* seem to be worth much. At the end Mr. Willis gives us some "general remarks" on Mr. Parkin's Report, the cream of which we extract in the following, although Mr. Willis has a good deal more to say:—

The ideal rubber-yielding tree would be one in which there were many laticiferous vessels, all communicating freely with one another, and containing only caoutchouc in an emulsion with water. The trees cultivated in Ceylon do not reach this standard, but depart from it in different ways. Hevea contains very pure latex, but its laticiferous vessels do not seem to communicate freely, so that a large number of incisions are needed to get all the milk; Castilloa has much freer communication, but a more impure latex, and less percentage of caoutchouc therein;

Manihot has poor communication and very impure latex, containing a small percentage of rubber. The objects to be aimed at in practice are principally:—

(1) To get a good quickly growing tree, which will yield a large quantity of rubber after as few years as possible.

(2) To obtain the latex with as little labour as possible, and with the greatest possible cleanliness, as all impurity lessens its value.

(3) To obtain from this latex as pure caoutchouc as possible, with the least practicable labour and cost.

(4) To get the caoutchouc as dry and antiseptic as possible. With regard to the first point, we have at present three trees which do well in Ceylon: Hevea Castilloa, and Manihot. The second desideratum is best supplied by Castilloa, which yields latex very freely from a small number of incisions, and also gives a very fluid latex. Hevea is second best in this respect, and Manihot worst.

Here we must take leave of this very full, instructive and suggestive series of papers. The conclusions arrived at are by no means final; but there is a great deal of light thrown on problems of much practical importance to Rubber planters who all ought to feel, as we do, specially indebted to Mr. Parkin and Mr. Willis.

BOGAWANTALAWA DISTRICT TEA COMPANY, LIMITED.

ANNUAL REPORT.

Report presented at the Second Ordinary Annual General Meeting of the Company, held at the Office of the Company of Wednesday, 28th June.

The Directors have the pleasure to submit the balance sheet and accounts of the Company for the year ending 31st March, 1899, duly audited.

Notwithstanding a deficiency of some 25 inches in the rainfall, the aggregate yield of tea exceeded the estimate, and the gross price obtained in London was 8·71 per lb. against 8·20 per lb. in the previous season.

The working expenditure compares favourably with the estimates, and in spite of a higher average rate of exchange the cost of production was lower, being 25½ cents against 26½ cents per lb. last season.

Since October last the Bridwell leaf has been manufactured at the Bogawana factory, and the sum of £954 18s 11d expended thereon to complete the extensions, has been charged to capital account. On the other hand, a sum of about £650 expended on renewals and improvements to existing factories, and in opening 75 acres new land to be planted with tea, has been charged to revenue account.

The total yield was 1,031,782 lb tea plucked off 2 081 acres, of which 86 acres are only in partial bearing, being at the rate of 495 lb. per acre all round, costing free on board Colombo 25½ cents or 4·12d per lb. The gross average price of the 1,024,646 lb. sold in London was 8·71d per lb., as stated above.

The crops for the current season are estimated at 1,020,200 lb. tea.

The gross average at which drafts were negociated was 1/4 5-32 per rupee, against 1/3 9-16 per rupee the previous season.

The Directors desire to place on record their appreciation of the services of their manager and his staff in Ceylon.

	£	s.	d.
The Profit for the year, inclusive of Interest and after providing for General Expenses amounts to ..	15,033	15	11
To which has to be added the Balance from last year of ..	958	14	4
And Interest	54	5	8
	1,013	0	0
Less Income Tax (season 1897-98) ..	435	1	4
	577	18	8
	15,611	14	7
Interest on the Mortgage Debentures has been paid, *less* Income Tax	406	0	0
Dividends on the 6 per cent. Preference Shares for the 12 months were paid on the 12th October, 1898, and 1st April, 1899, *less* Tax	5,394	0	0
An Interim Dividend of 2½ per cent on the Ordinary Shares was paid, *less* Tax, on the 11th Jan. 1899 ...	2,416	13	4
It is proposed:—			
To pay a final Dividend of 5 per cent. on the Ordinary Shares, making 7½ per cent. for the year, which will require, *less* Tax ..	4,833	6	8
To transfer to Reserve Account ..	1,500	0	0
And to carry forward to next year the balance (out of which Income Tax has to be paid) of.. ..	1,061	14	7
	£15,611	14	7

In view of the expenditure on buildings and clearings charged to revenue account, and of the fact that all buildings and machinery are in a high state of efficiency, the Directors no not consider it necessary to write off a specific sum for depreciation.

The Director who retires on this occasion is Mr. John Geoffrey Fort, who, being eligible, offers himself for re-election.

Mr. John Smith the Auditor also retires, and offers himself for re-election.

SCHEUDLE OF THE COMPANY'S ESTATES.

Estates.	Tea full bearing.	Tea partial bearing	Tea, not in bearing.	Forest.	Grass.	Chena and Patana.	Total acres.
Kirkoswald ..	756	—	—	*109	12	—	877
Bridwell ..	382	—	—	*71	5	15	473
Elbedde ..	559	46	100	27	15	—	747
Bogawana ..	298	40	4	*70	6	18	436
Total ..	1,995	86	104	*277	38	33	2533

* About 75 acres felled and prepared for planting with tea.

THE DIMBULA VALLEY (CEYLON) TEA COMPANY, LIMITED.

ANNUAL REPORT.

Directors' Report submitted to the shareholders at the Third Annual Ordinary General Meeting, to be held at the Cannon Street Hotel, on Monday, the 3rd day of July, at 12 o'clock noon.

The Directors beg to submit the General Balance Sheet and Profit and Loss Account for the year ending 31st March last.

After bringing forward £226 16s 9d from last account, and providing for general expenses, for

London office expenses, and £500 for depreciation, the net amount at credit of Profit and Loss is £15,709 4s 9d.

Dividends aggregating 6 per cent., less Income Tax, have been paid for the 12 months on the Preference Shares, amounting to ..	£3,440 2 6
An Interim dividend of 4 per cent., less Income Tax, on the Ordinary Shares, has been paid, and amounted to	£4,586 12
It is proposed to pay a final dividend of 6 per cent. on the Ordinary Shares, making 10 per cent. for the year, and which will amount to	£6,879 18 0
Thus leaving to be carried forward to next year a balance of	£802 12 9
	£15,709 4 9

The past season in Ceylon has probably been the worst ever recorded as regards the yield of tea. The crop from the Company's estates, owing entirely to untoward weather, has turned out some 70,000 lb. under the estimate, so preventing the full profit which your Directors were justified in looking for. The result, however, cannot but be said to be very satisfactory, and your Directors consider that great credit is due to those responsible for the management of the Company, both in Ceylon and London.

The total crop for the past season amounted to 930,281 lb. which sold for £39,127 13s 4d, or an average of 10·09d per lb., as against the previous year's crop, 833,874 lb., which realised £30,923 7s 4d or 8·90d per lb.

The Estates are in a high state of cultivation, a liberal expenditure, as will be seen by the summary below, having been allowed. The tea cost f.o.b. about 29 cents. of a rupee per lb., distributed as follows:—

General	·039 cents.
Cultivation	·072 ,,
Plucking and Manufacture ..	·171 ,,
Buildings (upkeep)	·005 ,,
Capital Account on Buildings Machinery, and Tea Clearings	£2,056 6 7

The freight, warehousing, and selling in London, cost ·93 of a penny.

Exchange averaged at the rate of 1/4·29, as against last year at 1/3¾, and 1/2 9·10 the previous year.

The outlay on capital account exceeded our intention of a year ago, but as practically the whole of this was laid out on factory extensions at Tillicoultry and Belgravia, the better prices realised have fully justified the outlay.

Mr. McDonell retires by rotation, but, being eligible, offers himself for re-election.

Messrs. Singleton, Fabian & Co., the Auditors to the Company, retire, and, being eligible, offer themselves for re-election.

GAME AND THE PARK COUNTRY IN CEYLON.

(*From Mr. D. Blair's Report, Survey Department,* 1898.)

PARK COUNTRY.—The park country is situated in scattered areas among the forests. One of the largest is the Hingurawatdamana situated between the Kandulla and Minneriya-oyas, covering not less than 10,000 acres. Another great park extent lies between the bund of the "Prakrama Sea" and the Ambanganga, and even between the Amban-ganga and Maha-weli-ganga along the road from Kotawela to Dastota. East and north of Polonnaruwa, too, there are thousands of acres of park country extending in a broken series to Kumadi village. The park country varies in openness. When very open it is possible to see for a mile through the trees dotted over the plain, while at other times they are so close as to be of the nature of an open forest. The trees are seldom of great size, and among them are many lovely blossoming varieties such as satin, ehela mee, damba, &c., and when many of these are in flower before the grass land is scorched it is the most lovely country in the Island to travel through.

GAME.—The chief big game in Tamankaduwa are elephant, buffalo, bear, leopard, sambur, cheetah, spotted deer, red deer, and pig. In the rainy season, when water is to be found in every "dola," the elephants are scattered over the whole country and seem to travel about considerably, but as water becomes scarce they retreat towards the Mahaweli-ganga and the vicinity of the great "villus." The steep banks of the river are worn into steps and stairs by these animals constantly descending to drink, and the marshy ramba grass land along its banks is pitted with their footprints. Buffalo are not plentiful and their destruction by sportsmen is discouraged by Government. They usually frequent the marshy pools near the park country far from human habitations, but they have often been known to attach themselves to a herd of tame ones. Leopards are found wherever their quarry is, be that where it may.

Bears are most common in the park country when the fruits and flowers they feed upon are ripe, but the search for honey takes them everywhere, and the marks of their claws made in climbing trees are met frequently. Their favourite haunts are in the vicinity of bare rock hills and boulders and caves as in the country south of Kotawela. They are the most dreaded of all the denizens of the forest by the inhabitants, and the number of the horribly disfigured and scarred bear victims among them show good reason for the dread.

Sambur are met with all over the district, but they are oftenest found in the hills or feeding in the park country. They rarely go in large flocks; a buck and two or three does with a fawn or so being the usual numbers met with, though occasionally the stag alone is met, and he is then most easily approached. Their breeding season is during the rains, and the young fawns are oftenest seen in the early months of the year.

Spotted deer are more numerous in Tamankaduwa than the other varieties, and in the dry season they are met with in herds of a score or so in the park country—the does being by far the most numerous. Their breeding season does not seem to be so well defined as that of sambur. In January and February many young fawns have been met, but again fawns are not uncommonly found in September at the end of the dry season.

Red deer are probably least common of all deer in Tamankaduwa, but they shun the open country and frequent the forests in pairs or often singly. No direct evidence of their breeding season was noticed.

Wild pig frequent the vicinity of paddy fields and abandoned but not quite empty tanks, in which they wallow. Among the Moor villages and in the low-lying "ramba-damanas" along the Mahaweli-ganga they roam in great droves of twenty or thirty, tearing up the ground as they go in their search for roots.

CHINA TEA—OR POISON?—An analyst records that there are over sixty substances used by the Chinese in colouring and weighting much of the tea that finds its way to this country. These substances include subacetate of copper, indigo, and tumeric mixed together to make a bright vegetable green; sulphate of lime or gypsum, to give the tea a greyish, smooth, glossy appearance; glucose of gum arabic water, to make the gypsum adhere to the tea; Prussian blue, Dutch pink, soapstone, graphite, rice, and starch.—*Daily Mail.*

NILGIRI TEAS.

PRICES AND AVERAGES: POOR JATS: WYNAAD SHIPMENTS.

In common with the rest of India, the Nilgiris have shared in the benefits of the remarkable recovery in the London market during the last few months. It is gratifying to note, besides, a marked improvement all round in manufacturing methods in the district—an improvement which, though inaugurated some half-a-dozen years ago, has not till lately attained its full development. That there is still room for very considerable improvement in methods of manufacture, pruning, and cultivation cannot of course be denied by any one conversant with the latest modes obtaining in Assam and Darjeeling. But the spirit of progress is in the air, and on all sides we hear of up-to-date machinery being imported, and a general inclination to drop for good and all the backward methods and appliances that in past years did such serious damage to the tea industry in the district.

Last week's sale report included shipments from six Nilgiri estates, the average price obtained being 7·72d per pound, less than a half-penny below the average for all India, and only one-fifth of a penny under the Ceylon average. The best prices were realized by New Hope, which has made such very gratifying progress in the last two or three years—with the very good all-round rate of 8¾d per pound. The shipment too was a large one, consisting of 340 packages, and on the whole, was fairly representative, the only grades not included being Pekoe Souchong and Dust. Kodanaad stands next with an average of 8¼d, with Pykara Falls 7¾d, Seaforth 7½d, Genmorgan 7¼d, and Hocorra 7d, following in the order named.

The Wynaad shipment was, however, still better the average being 8·16d, while even Travancore ranked higher than the Nilgiris with a rate of 7·81d per pound. The Wynaad, of course, though handicapped to a certain extent by the climate, has the advantage of all new tea districts in being planted up with the best possible variety of tea, a point in which the Nilgiris are so lamentably behind the times. It seems strange that even now, when the great advantages of the Assam *jat* have been proved up to the hilt, that extensions should still be made with hybrid varieties.—*Indian Planters' Gazette.*

SILVER GOLD AND PRICES.

The extraordinary fall in the prices of commodities during the past twenty-five years is put down by bimetallists to the depreciation in the value of silver; by monometallists to improved methods of production and transport. We are not going, in a few lines, to attempt to discuss such an intricate subject, but we subjoin some striking figures, taken (with the exception of the value of the silver produced, which is our own estimate) from a recent publication of the Gold Standard Defence Association. Judging from all previous experience, the enormous increase in the production of gold must, sooner or later, have a marked effect in raising the prices of other produce. There have been strong evidences already of a tendency in this direction, which may become more marked in the course of a year or two. Broadly speaking, if there are two sovereigns where there used to be one. the two will not, in the long run, buy much more than the one did. The tendency of prices to rise has been masked by the greater demand for gold from countries which had not a gold currency previously, or which wished to build up a war chest.

Silver Production of the World.

	Weight.	Price per oz.		Value.
1873 ..	63.000,000 oz.	59¼	pence	£15,553,125
1878 ..	73,000,000 do	52 9-16	do	15,987,760
1893 ..	165,000,000 do	35⅝	do	24,492.187
1898 (approx. estimate)	190,0000 do	28	do	22,166,666

Gold Production of the World.

1875	£20.000,000
1892	30.000,000
1899 (anticipated yield) ..	60,000,000

Average Prices of Commodities (on Mr. Sauerbeck's basis for the prices of 45 commodities.)

1873	113
1894	63
1895	62
1896	61
1898	64

—*Produce Markets' Review*, June 17.

PLANTING NOTES.

Peanuts.—This nut, so common in the United States, is very rarely eaten roasted in France and nearly all that enter the port of Bordeaux are imported from Spain, Italy and Africa. The variety is small and uninviting-looking and exorbitantly high, the price, being about three times that asked in America. The taste for these nuts as a food is growing; it is practically certain that if the American varieties were put upon this market at a reasonable price, they would find a ready sale. Many tons of peanuts are imported from the west coast of Africa, India and Malayan Archipelago and are sold in Marseilles and other European countries; these are principally for the oil, which is extracted from them. Peanut oil is used for cooking purposes and as an adulterant and substitute for olive oil.—United States Consular Reports, Dec. 1898, p. 539.

Spanish Peanuts: A new variety of Ground Nuts.—*(Arachis hypogœa)*.—This is a special variety of peanuts, grown largely in North Louisiana for forage purposes. Its growth is erect and, at maturity. the pods adhere very tenaciously to the stalk when the latter is uprooted. In sandy, or light, loamy soils, this operation of uprooting can easily be accomplished without hardly the loss of a pod. By gathering them in this way while the leaves are still green and curing the entire plant with adherent pods into hay, a large quantity of excellent forage of high feeding value can be obtained. This plant, as can be seen later on, has an enormous power of gathering nitrogen. It stores much of it in the fruit. It matures easily, and two crops upon the same soil have been made in one year at Audubon Park. This crop is frequently planted, and hog permitted to gather it is maturity. Its feeding value is very great, and this is abundantly corroborated by numerous experiments in feeding by practical farmers. The value to the land of this crop is very great, and the yield of nuts is sufficient, if grown in large areas, to justify a considerable commerce with profit to the farmer at present prices—three cents per pound in Norfolk Virginia.—*The Louisiana Planter and Sugar Manufacturer*, 11th March, 1899, *p.* 146.

PRODUCE AND PLANTING.

WEIGHING PAPER WITH TEA.—The Lipton case, the first stage of which was decided last week, is sub-judice, as it will shortly come before a higher court. It is pointed out on behalf of Messrs. Lipton that a mistake had crept into some of the reports of the proceedings, in which it is represented that the deficiency in a 1lb packet amounts to as much as 2oz. White the company make no secret of the fact that their 1lb packets include the weight of the paper, it is of course, quite wrong to imagine that the paper weighs anything like 2oz. The explanation is that drachms have been mistaken for ounces in the reports in question. It was stated during the hearing of the case before the magistrate that including the weight of the wrapper in the weight of the tea was a custom of the tea trade "from time immemorial." This has hurt the feelings of a number of firms who do not follow this custom. So many packet tea trading firms have denied this soft impeachment that it is necessary to remove the impression that it is a general custom to include the weight of the paper with the tea. It is stated on behalf of Messrs. Lipton that the £17,000 mentioned as profit on this method of selling tea during a year's operation is greatly exaggerated, and that the sum of £2,000 would he nearer the mark. It is also argued in defence of those who sell the paper with the tea that if a buyer goes into a grocer's shop and buys a pound of sugar, in the ordinary way, the grocer places a piece of paper on the scale, puts the sugar on it, and when the scale is turned, does the packet up and sells it. No doubt if the buyer wanted it he would give the sugar without the paper, and the buyer would get a little more. It is the same in regard to packet teas and all other articles sold in packets. This is ingenious, but not conclusive.

INTERESTING FIGURES.—Apropos of the Lipton case, a correspondent writes that the turnover of Lipton's business is estimated at 3,000 chests per week. It follows that if, as was proved when the company was convicted for selling at short weights, the gain is 3 per cent, there would be three pounds of tea in every chest which would virtually cost nothing. This, on the turnover of 3,000 chests, would equal ninety chests gained per week. Taking the value of the quantity gained at 1s per pound duty paid, the money value would be £450 per week, or £23,400 per annum.

NATAL TEA.—Indian and Ceylon tea planters have not taken tea growing operations in Natal seriously, at present looking upon tea cultivation in that colony more as an interesting experiment than in the light of competition. Doubtless the supply of Natal tea in Mincing Lane will be on a small scale for some time to come, but it cannot be denied that tea planting in Natal can be profitably conducted. A correspondent of the "Grocer," who is very enthusiastic about them informs the tea trade that "Natal tea will soon be definitely on the market," and that the analysis of these teas is "really first-rate." He says: "There is a due amount of caffeine present which should make them mild, yet sufficiently strong in the invigorating properties. The low per-centage of tannin should make these teas welcome to the dyspeptic, and indeed to everyone who thinks much about his digestion. In each case the percentage of tannin appears to be much lower than that which is found in samples of Indian tea. The other items in the analysis are quite normal; but when we come to the ash we find a rather unusual ingredient, for it contains a notable percentag; of manganese. This is undoubtedly derived from the soil, in which manganese is fairly widely distributed. I am not aware that there is any soluble salt of manganese in the tea which could be dissolved out by the water, and if there is I do not know what the precise effect upon the system would be to anyone drinking it. So far as can be gathered, the amount which would be taken in a cup of tea if it really does dissolve, is so insignificant as to be practically without any importance whatever, and so it may be disregarded. On the other hand, if the manganese only exists in the tea leaves and is not dissolved out, then of course it has no significance whatever to the tea-drinker."

BRAZIL COFFEE.—The British Consul at Rio de Janeiro, in his report received on Brazilian affairs, speaks in hopeful terms of the coffee planting industry, and expresses surprise that, although some hundred millions sterling of British capital are employed in public funds and enterprises in Brazil, so little has been invested in the profitable pursuit of coffee planting. It may be due, he thinks, to a feeling of insecurity as to the protection afforded to the property of foreigners in the interior of the country; but he notes with satisfaction that the President of the Republic has made a powerful appeal to the State Government to extend full protection to all immigrants and foreigners.

COCOA.—The consumption of cocoa is increasing rapidly. In some countries this is very noticeable. Germany has doubled her consumption of cocoa since 1882, and England has considerably more than doubled hers. In France the consumption was in 1868 about 15,000,000 lb, which figure has now been more than doubled. The annual consumption in the various countries was, according to some recent statistics: France, 30,500,000 lb; United States, 26,400,000; England, 22,100,000; Germany, 19,900,000; Holland, 17,000,000; Spain, 12,800,000; Switzerland, 4,800,000; Belgium, 3,600,000; Austria-Hungary, 2,200,000; Russia, 1,900,000; Denmark, 1,400,000; Italy, 1,100,000; Swepen, 800,000; Norway, 300,000; Portugal, 200,000. Reduced to annual consumption per individual Holland heads the list with three and a half pounds per head, Switzerland comes next with one and three-fifth pounds, and France third with four-fifths of a pound. —*H. & C. Mail*, June 23.

MINOR PRODUCTS REPORT.

LONDON, June 15.

CARDAMOMS.—A fair "jobbing" trade has been done this week at well maintained prices, the demand being especially for seeds.

COCA LEAVES.—There are numerous enquiries to be met with but little or no actual business. Truxillo leaves are offered at 10d and Huanuco at 1s 3d.

OIL OF CITRONELLE.—A fair business has been doing this week the tone is slightly better. Drums are offered on the spot at 1½d and tins at 1s to 1s 0½d.

OIL OF LEMONGRASS.—Still quiet, and purchasable at 2¾d spot.—*British and Colonial Druggist* June 16.

London, June 23.

CANELLA BARK.—Fair bark can be bought at 35s per cwt.

CINCHONA.—The auctions on Tuesday were not animated in the sense that the tea sales next door were, for tea buyers have a style of their own which is a hybrid between a bear garden and the Chicago Wheat Exchange. The offerings at the cinchona sales were limited to five catalogues, and much of the stuff had been seen before. It was also notable that the usual large buyers on this occasion stood down, not caring to go to the extreme rates which the ultimate purchasers paid. The cinchona bark auctions to be held in Amsterdam on July 13th will consist of 5,611 packages of Ledger and hybrid, of 577 cases and 677 bales of succirubra. The stock in first hand at Amsterdam consisted on June 20th, of 2,044 packages Government bark, and 8,259 packages private bark, including the quantity to be offered in the next auction.

LEMON OIL.—Dearer by 3d to 6d per lb, according to holders. Super is quoted 3s spot, and extra super 3s 8d f.o.b. Messina; these are the lowest prices in the classes mentioned.

KOLA NUTS.—Firmer, West Indian having sold at 2½d, and more was wanted for African.

VANILLA.—Tahitis were offered today, apparently as a matter of form, for only 1 tin sold at 6s 6d per lb., 4 inch to 6 inch beans.—*Chemist and Druggist*, June 24.

FACILITIES FOR MAKING TEA IN CEYLON:
IN CONCLUSION.
DIVERSE OPINIONS ON THE VALUE OF MANURING; PRUNING AND JÂTS.

We find three returns from well-known planters have escaped attention in our series of summaries on this subject. One of these writers who has had much experience in the systematic manuring of coffee as well as tea, in answer to our enquiry, "Would manuring improve the tea and be profitable in your opinion?" says:—"Yes, manuring is profitable. I can't say it improves the tea; but it makes you pretty independent of the weather, for manured tea flushes, when the other through climatic causes has got shut up"; while a second, also a practical observant Manager replies:—"Yes, both in quality and yield, and systematically carried out, manuring is profitable, with decent prices." The third answer comes from a Visiting Agent with a wide area of observation, who remarks:—"Manuring improves quantity of yield, but it is disputed as to its improving quality. It is only profitable where estates yielded a profit previously." Here then we have perhaps the last word upon "Manuring" until the scientists and especially Mr. Kelway-Bamber demonstrate how both quality and quantity may be secured by carefully adopted manuring and appropriate cultivation. By the way, there is a rumour that in regard to the kind of application suited to Ceylon tea estates, there is a good deal of difference of opinion among Analytical Chemists, each of whom have testimonials from different districts as to the good effect of diverse manures. All will, no doubt, be made public in due season, and perhaps the old saying may come true that in "a multitude of counsellors, there is safety."

As regards other elements towards successful cultivation, it is noteworthy that while our "V.A." critic considers that machinery as a rule is now sufficient to the needs of factories—some, of course, being better provided, especially in regard to withering room, so getting a higher average,—he adds that there are really very few factories in the island that have a sufficient reserve of withering accommodation to cope with "the rush of leaf" which is experienced in most districts during one or other month of the year. In the same gentleman's opinion there should be no complaint of want of sufficient "motive power" now-a-days, in view of the great improvement in oil engines and the grant of a Customs rebate on machinery oil. About "pruning" the same authority does not think that planters use the knife before there is the necessity nor that they prune severely where lighter pruning should suffice. In other words we have arrived at the stage in Ceylon where the superintendents of tea plantations have—through instruction, example, observation and experience combined—acquired that practical acquaintance with their work in all its details, which in years gone by, placed them or their predecessors in the very forefront of the world's cultivators of coffee. Of course there are exceptions; but we take it this is what our correspondents generally mean to imply. As regards "jât" we are shrewdly reminded that "a good jât tea as a rule gives more strength; but medium jâts give a better appearance and sometimes better flavour"—to which may be added the fact that "indigenous" and so-called high class jât tea, has undoubtedly been found in Ceylon more subject to "blight" than the hardier Assam-hybrid. In judging of the older planting districts, we must always remember how most of the estates were made out of old coffee or scrub land, and yet a good authority declares that estates within a ten mile radius of Kandy can hold their own as regards "quantity," though the average price for their tea can never be a high one. Tea of a good fair medium strength (says a planter within the radius) can be made; but there are too many competitors in the same grade, to benefit much thereby. On the other hand, he adds:—"we have the advantage of cheap transport which is not enjoyed by some other medium districts." The influence of "fine plucking" as regards quality and of particular seasons as respects both quantity and quality, must not be overlooked; while no doubt from "Dan to Beersheba" the cry of "the poor but honest and industrious planter" will find an echo, when he says:—"We can all grow tea, but it is a hard struggle to grow it so as to leave a margin of profit with low prices and high exchange." Nevertheless, let us hope that an increased demand for Ceylon tea in North America, Russia and the Continent generally may make the "margin" a real and constant factor; for as the old song has it:—

> "We've lippen'd aye to Providence,
> An' sae will we yet.

Only the tea planters of Ceylon know well, and act on the knowledge, that Providence generally helps those who help themselves—so, let the "Tea Cess" continue to be wisely administered and may our Indian planting neighbours do their best to get a similar Cess collected on their tea, so as to secure the means for driving out 'China's and 'Japan's' from North America and the Continent of Europe, at the earliest possible date.

MANURING FRUIT-TREES IN HOLSTEIN.—A method of fertilising fruit-trees in vogue in Holstein is suggestive, and not unworthy of a trial. The trees, it is said, receive no cultivation, and the fruit is large, sound, and produced in abundance. Every two years a few holes are dug in the ground about 4 or 5 feet from the trunk of the tree, and about 1 foot deep, closer and shallower in the case of young trees. These holes are filled with liquid-manure about four times during the winter months, and for young trees this is diluted with water. If there is more liquid-manure than is wanted, it is distributed over the surface of the orchard, using an old street sprinkling-waggon for the purpose. There is no reason why manure water should not be used once or twice after it is seen what the crop is likely to be; of course, not affording any at that season to trees not bearing a crop, or which are carrying only a few fruits, as to dose them would be to encourage, probably, an unnecessary growth of shoots. But in this matter, the cultivator must be guided by the condition of the trees, and of the soil.

ALLEGED CEYLON TEA CONFISCATED IN LONDON.

There is more in this matter than we understood at first and we hereby call on the Chamber of Commerce or "Thirty Committee" to investigate the same. It seems from all we have been able to learn that the tea actually confiscated and destroyed in England, *was landed there in bags* and is alleged to have been discharged by one of the "Maru" boats. Now, we understand that no such shipment was made by any steamer from Ceylon: and Ceylon tea is never shipped in bags. Either "an enemy hath done this"—some one from Japan sending the stuff on and labelling it as from Ceylon—or the London Customs has made a mistake as regards the port from which the bags came. Could not the Agents of the "Maru" boats be asked to make inquiry in London and ascertain on what documents the Customs officials fixed "Ceylon" as the country from which the stuff came? We do not think the matter should be passed over, as it ought to be easy to trace where (if not by whom) the shipment was made.

JAVA QUININE.

Mr. C. W. van Heeckeren, Director of the Bandoeng factory, has written a very long letter to a Java paper to protest against certain serious insinuations made in that journal, in which it was alleged that the Bandoeng works had carried on a private speculation in quinine made by them for Java planters. It was said that the factory had led the planters to believe that this quinine was held in stock for the planters' account, whereupon in reality it had been privately sold by the factory. Prices subsequently rose, and when the planters gave orders for their quinine to be sold, it transpired that it had already been disposed of mouths ago, whereof the planters decided to break off relations with the Bandoeng works, and to consign their barks to Amsterdam as before. The statement was made that the German quinine-makers, out of their enmity to the Bandoeng works, had purposely engineered a rise in the market as soon as they got wind of the aforesaid speculation, so as to bring about a breach between the planters and the Bandoeng works. Mr VanHeeckeren denies all these allegations. He says that the factory is debarred by its articles of association from trading in quinine, all that the works make being sold through to Messrs McNeill & Co., of Samarang. The accounts between the works and the planters are settled in March of each year, when Messrs McNeill are in possession of the account sales for the whole of the preceding year. No one could have foreseen the sudden rise of quinine to 1s 9½d last March, and Messrs McNeill before that rise had sold at from 12½d to 14d per oz on delivery. On January 1st about 5,000 kilos of quinine had been made by the factory, for which the owners had not yet received an account sale. Of this only 120 kilos were at the works, 1,000 kilos were at Batavia, and 3,600 were on the way to various ports. During January and March about 3,200 kilos made at Bandoeng were sold. Mr Van Heeckeren complains that the Bandoeng factory is badly supported by the Java planters. Some of them habitually belittle it, and carp at its working. The total production of the Bandoeng factory between January 1st and March 13th was 320,000 oz, of which Messrs McNeill had sold in the same time 253,580 oz, at an average equivalent of 7c per unit gross. Incommenting upon Mr Van Heeckeren's letter the Java paper maintains its allegations, although it acknowledges that the speculation was not undertaken for motives of illegal personal gain, but was merely an ill-considered speculation in the interest of the planters, who, unfortunately, have turned out losers over the affair.—*Chemist and Druggist*, June 24.

AGRICULTURAL PRODUCTS OF TOGO-LAND.

The principal products of Togoland (a German colony in West Africa, between the British gold coast possessions and Dahomey) are oil palms, coco palms, india rubber and coffee. The most important from the European point of view is the kola nut, to the cultivation of which great attention is being paid. Regulations have been issued to prevent the wanton destruction of india-rubber trees, and the dealers receive licenses from the Government. Only natives are allowed to collect this product, strangers being forbidden to ply the trade without a special license, which costs £50 a year. It is not allowed to give natives an advance on the year's yield. According to a recent report by the Second Secretaries of H.M Embassy in Berlin, the cultivation of the oil palm has not yet been undertaken by Europeans, and remains in the hands of the natives. Good building wood is supplied by the following trees:—*Chlorophora excelsa, borassus flabelliformis* and *eryodendron anfractuosum.* There are six coffee plantations, the number of trees varying from 30 to 3,000. The yield is given as 4,300 kilogrammes (9,479 lb.) Coconuts last year were grown in five plantations, varying from from 33 to 1,000 in each, and the yield was 10,000 nuts. New undertakings are in view. In the mountains, five days journey from the coast, the natives are growing coffee with success, and plantation on large scale with European capital will shortly be commenced. The india-rubber tree (*manihot glaziovii*) is grown in the coffee and coconut plantations. It does fairly well, but suffers from a blight (*Loronthocos*) which does much damage. Cassava (tapioca), yams, maize, and earth nuts are also cultivated with success. An experimental plantation is carried ou at Sebbe. It has been found that the trees which do best are mangoes, eucalyptus, banana, bixa orellana, oranges, and coffee. Mulberry trees do well in the rainy season, but three-quarters of them die in the dry season. A new garden is being started at Lome, where native gardens are being trained. Coffee, manihot, *kikxia africana, inophyllum, &c*, are being raised from seed. The following annuals are being grown:—*Ricinus, sesamum indicum*, oil plants, maize, *andropogon* and *corchorus capsularis.* —*Journal of the Society of Arts.*

COFFEE AND TEA IN THE NILGIRI: OOTY, June 3rd.—A doleful year this is likely to be, my masters, for planters of coffee, for prices are falling, falling every day, and there seems no end to the depths into which they are plunging. And to make matters worse, if worse they could be, the rain on the open blossom has done immense harm to crops. Kotagiri way they are still hopeful, but there hope is getting thin. Goonoor,—well there is an end of hope for them, and the damage to the coming crop is put down at one-third to two-thirds of the whole. On the western slopes, in the Ouchterlony Valley and Nallacottah, things are a great deal better, one enthusiast declaring his 1899-1900 crop will be one of the best on record. Tea, of course, is sharing in the general improvement in prices, and the season is, moreover, and exceptionally favourable one. New Hope, one of the Valley estates, is attaining quite a respectable position in the home market, and for very good all-round breaks too. Another estate, long known for its excellent prices, Nonsuch to wit, on the Coonoor side, is also coming forward again after a year's slum.—*The Indian Planter's Gazette*, June 10.

PENRHOS ESTATES COMPANY OF CEYLON, LIMITED.

REPORT.

The report of the directors for the past year which is as follows was taken as read :—

"The Directors have pleasure in laying before the Shareholders their Report and Accounts for the year ended 30th June, 1899.

The amount of Tea secured was 201,020 lb.—158,106 lb. on Estate account, as against an estimate of 165,000 lb. and 42,914 lb. manufactured from bought leaf.

In view of the severe drought during the latter half of the Season, the crop may be considered satisfactory.

The following figures, shewing the results of the past three Seasons, will be found interesting.

	Crops in lbs.	Cost laid down in Colombo in cents.	Or without Manure.	Nett Average Price.
1896-97 ...	155,625 ...	27·52 ...	26·31 ...	36·42
1897-98 ...	145,250 ...	26·23 ...	25·65 ...	39·12
1898-99 ...	158,106 ...	25·41 ...	24·05 ...	41·03

These figures refer to the Estate tea only.

As regards the Season under review, the total crop secured has cost, laid in Colombo, cts., 26·43, and has realized a nett average price of cts 40·27.

Included in the proceeds of tea is a sum of R506·80, being balance proceeds of tea unsold at 30th of June last year and estimated for.

After payment of the Interest on Debentures, namely, R 3,030·00, the amount at credit of Profit and Loss Account is R23,237·52, which is equal to 15½ per cent on the Capital of the Company, as against 9 per cent last Season, and 5¼ per cent the year before ; this may be considered very satisfactory.

The Directors recommend that this sum be apportioned as follows :—

By the payment of a dividend of 10 per cent for the year	R	15,000·00
By the payment of a bonus to the Superintendent	,,	1,000·00
By placing to Reserve fund ...	,,	7000·00
By carrying forward to the next Account	,,	237·52
	R	23,237·52

The Directors desire to place on record their appreciation of Mr. J. E. Martin's management of the Estates during the Season under review.

It is proposed to open a further 10 acres in Tea during the coming Season, and another 20 acres in 1900-1901, there being sufficient Capital in hand to do this.

The Acreage of the Company's Estates is as follows :—

Old Tea	508	Acres
Tea under four years ...	25	,,
Tea not in bearing ...	24	,,
Forest	51	,,
Waste and Patna Land ...	212	,,
Total	820	acres

In terms of the Articles of Association, Mr. W B. Kingsbury retires from the Board of Directors, but, being eligible, offers himself for re-election.

THE FUTURE OF COFFEE,

(By a Planter in India.)

The whole of my argument turns on the supposed increase in consumption, the check on production, and the probability of a rise in the rate of Brazilian exchange. As regards the first condition, I rely mainly on the analogy of 1881-86, but there is plenty of direct evidence that consumption is increasing. It is true that

THE CONSUMPTION OF COFFEE

in the United Kingdom has not increased with the population, but the *Westminster Gazette* reports an enormous increase in the year ending March last in the number of cups of coffee sold in refreshment rooms. One firm alone used 134 tons of coffee in 1898-99 for this purpose, against 48 tons in 1897-98. Still, it is to the great coffee consuming countries of the Continent and America that we must mainly look to dispose of the increased production. The average annual consumption in ounces per head of popolation of late has been as follows :—Holland, 370 ; Denmark, 247 ; Belgium, 176 ; United States, 155 ; Switzerland, 112 ; Germany, 78 ; France, 53 ; Austria, 52 ; Italy, 17 ; Great Britain, 11 ; Spain, 9 ; Russia, 3. The British Consul at Hamborg, which is the great importing centre for Germany and its immediate neighbours, reports that, as a natoral consequence of the low price of coffee in 1898 (about 9*d*. a lb. in spite of high import duties), there is a largely increased consumption in Germany and other countries. The following figures for deliveries in the United States are from the *American Grocer* :—

	1896-7	1897-8	1898-9	
Avg. monthly deliveries.	424,049	503,026	497,435	bags.

In 1897-98 the deliveries were the highest on record and unduly stimulated by the fear of a duty, but those of 1898-99 show little falliog off. Yet with these heavy deliveries, the *American Grocer* says, there was no gain in stocks, showing that the coffee actually went into consumption. This consumption was per head of population :—In 1896, 8·7lbs ; in 1897, 10·9lb.; in 1898, 10·7lb. The New York correspondent of the *Grocer* gives the following consumption of made coffee per head of population :—In 1893, 14 gallons ; in 1898, 19 46 gallons. He attributes the increase to the great roasting firms selling coffee at 5*d*. a lb., and estimates that nearly four times as much coffee is drunk as there is tea, because coffee is the cheaper beverage. The English retail price of coffee has remained at about 1*s*. 8*d*. a lb, for the last 25 years, whether the wholesale price was high or low. If cheap coffee was pushed in England as in America, we might see a great increase in the consumption of the United Kingdom.

Turning next to the

CHECK ON PRODUCTION,

the following facts will show I considerably understated my case. From Mexico, Ceylon planters who have tried coffee cultivation there are returning and reporting in the *Ceylon Observer* that cultivation is unremunerative at present prices. A local (Mexican) paper says :—"The present price of coffee offers no margin to planters worth talking about. It is plain therefore that plantations will be abandoned and the crops reduced until prices rise again. It will be remembered that about 15 *years ago, under very similar circumstances an extensive area went out of cultivation*." From Ecuador and Venezuela it is reported coffce is being abandoned for new industries. Probably the same is true of the other Central American countries, as we know they all complain of the scarcity of money hampering trade ; and a disease has appeared in Guatemala and Nicaragua "which has made many plantations valueless." The British Consul at Rio reports the same movement toward new industries, and says :—"On more than one occasion the current price of coffee did not cover the carriage from the interior, so that it is fully expected by those interested that, owing to neglect in clearing the trees and the abandonment of new plantations every year will show a gradual diminution of production." In spite of the optimistic views of the President of San Paulo, the Brazilian papers do not hesitate to say, that "the coffee industry is no longer a paying one," and that even estates like the San Paulo Coffee Estates, bought at comparatively low prices and worked by cheap European capital, are not remunera-

tive. The Santos correspondent of the *Brazilian Review* reports that planters are trying to combine to reduce wages, but that the Italian labourers are leaving the estates and are settling in the towns. We all know by experience that an attempt to reduce wages when labour can go elsewhere is a policy of desperation!

Nearer home it is reported by Mr. Elliot and the Coorg Planters' Association that

A LARGE ACREAGE OF NATIVE COFFEE

has been abandoned in Mysore and Coorg. From the Straits, the *Malay Mail* and Sir Græme Elphinstone, a Ceylon planter settled in Perak, report that planters are being driven by low prices to abandon coffee for coconut cultivation. The British Consul in Java reports that sóme plantations are being disposed of and more are likely to be abandoned if no improvement in prices takes place. In fact, not only is there a decided check on the increase of production all over the world, but a prospect of an actual diminution of production. And East Indian planters have this advantage on the present occasion. Fifteen years ago East India prices fell *pari passu* with those of Brazil; but the prices of all rough coffee began to fall heavily in 1897, wheras East India prices were not seriously affected till this year. So that, taking into account only the effect of the natural increase of consumption and check on production caused by low prices, it should, on the analogy of 1881-86, take only two years more for prices to rise again. This is the actual time named by the *American Grocer* as that during which grocers can reckon on low prices.

This calculation, however, leaves out the factor of

A RISE IN BRAZILIAN EXCHANGE

which is almost certain to occur. The following figures will show that the value of the millereis depends almost entirely on the amount of paper money in circulation:—

	Paper money in circulation.	Rate of Exchange	Population (including Indians.)
In 1887-9	about 200,000 contos	22*d*. 27*d*.	14,000,000
In 1892	„ 556,000 „	12*d*.	15,000,000
In 1898	„ 790,000 „	8*d*.	17,000,000

For an increase of population under 25 per cent. the paper money was nearly quadrupled, and Exchange fell in 1897 to under the quarter of the par value which obtained in 1889. The quadrupling of the paper money made no difference in the gold value of the circulation per head of population, which was almost exactly the same in 1898 as in 1889. This fatal over-issue of paper money was due to false ideas of the value of money, to the weakness of constantly changing Governments, to reckless extravagance in the cost of administration, and to gross laxity in the collection of revenue. In December, 1896, an attempt was made to raise the value of the millereis, and a law passed assigning certain funds to the redemption of paper money; but practically very few of these funds were applied to this purpose up to 1898. In that year the President-Elect paid a visit to Europe and arranged with Rothschilds the following scheme, which came into force on the first July, 1898:—£10,000 000 is to be advanced by Rothschilds on the security of the Customs revenues, and the interest on the Government debts, amounting to nearly £3,000,000 a year, is to be funded for three years. As funding bonds are issued, Government undertakes to deposit an equivalent amount in paper money at the exchange of 18*d*. per millereis with certain Banks. This paper money is to be destroyed, or used to purchase Bills in London when Exchange is favourable, that is, at or over 18*d*. per millereis. By this means it is proposed to reduce the excessive paper money by 133,000 contos (thousands of millereis,) when it is expected the millereis will rise to 18*d*., "the rate agreed on." Strict economy is also to be practised by the Government, and the revenue is to be duly collected, when it is expected to yield much more than it has hitherto done. Up to March last, or for nine months since the scheme came into force, Government has burnt 9,000 contos of paper money; has paid off 31,000 contos of debt instead of as usual incurring fresh debts, and had a credit balance of 2,600 contos with the Banks in place of the usual debit balance. Up to the end of 1899 the benefits of the scheme will be retarded by the debts contracted in 1897, but from 1900 onwards the full benefits of the scheme will be realised.

Although since the new President came into office the Government has faithfully fulfilled its obligations, it is obvious that this scheme cannot be judged by its effect on Exchange in the first nine months of its existence. As a matter of fact, Exchange was raised at once from about 6*d* to 8⅝*d*., and though it receded a little below 8*d*. for a time it now stands at 8 3-32*d*. But the Government of India's scheme for fixing Exchange failed to be of any beneficial effect to Indian Exchange for the first two years of its existence, and yet succeeded in the next two years in raising the value of the rupee to the desired level. So probably every year the Brazilian scheme is kept at work its influence will increase in geometrical progression. We may fairly hope that the Brazilian Government, having begun so well, will carry out the scheme without wavering—more especially, if it does not raise the millereis to 18*d*. in three years time, it will be face to face with bankruptcy.

There is another reason which has not yet been touched on why coffee prices cannot long remain at a low level, and that is

THE INCREATED COST OF PRODUCTION

all over the world. Twenty-five years ago coffee was grown in India chiefly without manure. Now manuring is almost universally necessary, and this has increased expenses quite 50 per cent while the yield has not increased. In Brazil, the substitution of Italian for slave labour, the exhaustion of land near the sea board, and the opening up of districts in the interior seems to have increased the cost of production about 75 per cent in the last 15 years, for Brazil coffee is now worth in millereis quite that much more than in 1885 and yet does not pay any more than it did then. Thus:—

	Gold price.	Exchange	Millereis price.
1885-6 ..	48 francs	19*d*.	24
1798-9 ..	34½	8*d*.	41

Similarly the cost of growing in Central America must have about doubled, as the rate of Exchange in nearly all Central American States is about half what it was 25 years ago, and yet present prices are unremunerative.—*Madras Mail*, July 17.

THE "STATIST" ON TEA PROSPECTS.—The following are the material parts of the article we referred to on Saturday:—

We think, that the prospect before the tea-growing industry of India and Ceylon is a favourable one at the present time, and that the moment is opportune for considering investments in the shares of sound companies. In this industry, as in others, there is no lack of "wild-cat" enterprises; but there are also good and sound ventures which may be brought to give a comparatively high yield, and at the same time afford a reasonable measure of security. We give below some notes on companies which have recently issued their reports, which will assist readers in making a selection. As the fall in last year's profit is due in the main to temporary causes, there seems a prospect of larger distributions in the future, and some may be inclined to invest in the shares as a somewhat speculative lock-up. *Ceylon Tea Plantations.*—This is one of the older companies, which has the recommendation of having maintained a dividend of 15 per cent. on its Ordinary shares for many years. Profits for 1898 were £41,381, as compared with £42,199 in 1897, the slight decline being due to the crop being rather below that of 1897 and to a rise in exchange. The issued capital of the Company is as follows:—

£	Shares.	Nom. value. £	Price.	Yield per cent.
167,380	Ordinary	10	26¼	5¾
81,080	7 Per cent. Pref.	10	18	4

The reserve fund now amounts to £95,000. At present prices, both the Ordinary and the Preference merit attention.

Correspondence.

To the Editor.

AN ANSWER TO "QUERIES FOR TEA MAKERS":

MR. THORNTON PETT'S ANSWER.

Elpitiya, July 11.

SIR,—I have just come across a letter in your last weekly edition, signed "Enquirer" asking "what errors in the manipulation of tea leaf could cause the *dry* leaf to have a reddish brown appearance." Here are a few suggestions, at his service, towards an answer:—

Under-withered leaf kept rather long in wet weather, gives, as you say in your note, a large percentage of red leaf.

Over-withered coarse leaf also gives a very large percentage of red and reddish leaf.

One seldom gets a good colour on tea made from fields in which the bushes have run a long time from pruning. Leaf carelessly treated in the withering lofts, left in heaps, and trodden on by coolies also turns out a reddish tea; so does leaf that has got heated in bags or baskets whilst in transit to factory. The remedy for these is obvious.

I believe it is the almost universal experience in Ceylon, and I know it is a fact in several districts at medium elevations, that leaf plucked during a prolonged drought, and especially if there is any wind at the time, gives tea with a very pronounced reddish tinge, however fine the plucking may have been and though there may be no actual red leaf in it. This tea, though wanting in black appearance, generally sells well as the flavour is decidedly augmented: this is notably the case in Uva, witness the sale prices of teas made on estates there in July and August, the dry months of that side of the country.

Re your correspondent's second query: "Does the handling of the leaf in the drawers of drier cause greyness of the dry leaf?" If he fills his drawers or trays properly, there should be but little handling required, and the *necessary* amount of such handling will not perceptibly "grey" the tea. A mistake some tea makers are apt to make, under the false impression, that they are saving time, is allowing the firing coolies to lump on to the drawer or trays as much rolled leaf as they possibly can, when a good deal of turning over is, of course, required to get all the leaf fired equally. Trays should always be spread thinly, and pushed or worked through quickly. It is well to bear in mind the rule that was in force when we used chulas, *i.e.*, that it should be possible to see the fire through the leaf on the loaded tray. Leaf *saturated* with water just before being put into the drier will, however, come out rather grey if much handled by the firing coolies, and a sort of black "soot" or bloom will be found adhering to the coolies' hands and the mesh of the tray. I have ascertained this from actual experiment. This bloom is, of course, sap from the leaf cells broken up in the rolling, and which has got diffused over the surface of the leaves. It follows from this, I think, that leaf which has been carelessly fermented, and allowed to get dry during the process should be only slightly moistened with water before firing and not saturated as I have seen it done by some tea makers.—I am, &c.,

GEO. THORNTON PETT.

TEA: AN INDIAN AND CEYLON DISTRIBUTING AGENCY.

Madulkele, July 19.

DEAR SIR,—Could not the present moment, whilst the Indian and Ceylon trade in tea is at a standstill, be seized as an opportunity for starting an Indian and Ceylon Distributing Agency, and break down effectually the combination against us? The Agency's duty should be to buy tea as required in the London market (no draft allowance) and supply outside dealers, grocers, and even take private orders of not less than a chest or box. Advertise in every paper supplies direct from importers at wholesale rates, expenses of starting to be guaranteed by Indian and Ceylon Planters' Association—latter out of Thirty Committee funds. Surely with such good men on the spot as Rutherford, Henry Bois, Leake, Campbell for Ceylon and others for India, the thing could be done. The Agency started and properly organised at once, and a Company of Indian and Ceylon men would doubtless come forward afterwards to take over the going concern.

I think the attempt to do away with the 1-lb allowance has been a mistake, and has been undertaken without sufficient forethought or preparation and at an unfortunate time. I don't believe that the new arrangement, if carried, will benefit growers one bit. It is not wise to interfere with the channels through which trade passes; but now that the channel is blocked why not make a new one?—Yours truly,

CUSTOS.

LOCAL ALLOWANCES ON TEA.

July 19.

DEAR SIR,—Here is a resolution that has been omitted at the Tea Traders' Association meeting to be held today:—

"That before we take any active steps *re* 1-lb. draft in London, we must wash our hands clear of the allowance we have imposed on sellers in our local market."

PLANTER.

[Will "Planter" tell us plainly what he means? Does he want his tea sold without any samples being given out?—if so there will be little or no chance of bids. Does he grudge 3 lb. for samples out of 1,500, or 1,000, or 500 lb.? If not, to make all his breaks up to that weight is the only remedy we can see. A merchant, who is himself a proprietary planter, declared in our office yesterday, that 3 lb. is now-a-days scarcely enough for sampling: so many buyers have to be attended to, in Colombo. "I wanted the other day" he said, "to see a little more of a certain tea than the wee sample I had got so I went round to the Brokers, and found they had less left than in the days when only 2 lb. were taken for samples."—"But is it

not hard," we remarked, "that 3 lb. should have to be taken out of 100 lb.?" "Well, whose fault is that, save the planter's, who is idiotic enough to send so small a break for sale?"—The remedy therefore is solely with the planter so far as we can judge, unless he cares to instruct his Brokers to give out no samples.—Ed. *T.A.*]

RUBBER IN MEXICO: CASTILLOA ELASTICA.

Henaratgoda, 21st July 1899.

Dear Sir,—I beg to enclose particulars on Castilloa Elastica cultivation supplied by a leading Rubber planter in Mexico at my request, who has several plantations of his own. I trust that the particulars will be usefulto the readers of the *Observer* and *Tropical Agriculturist.* He writes:—"A good many plantations of this tree are being started all over the Southern part of this country now, but owing to their being still young, seeds have still to be gathered principally in the forests."—Yours faithfully.

J. P. WILLIAM.

"CASTILLOA ELASTICA."

(*To Messrs. J. P. Wiillam & Co., Ceylon.*)

Mexico, June 1.

The fresh seeds are sown with or without the surrounding pulp in the nursery bed at one foot's distance, giving them some shade, and keeping the ground well drained. The best soil is considered to be alluvial sandy loam, but I have seen very large rubber trees growing on clayey soil, and in many localities the trees seem to grow with preference on the hilly ground and not down in the bottom of the canyons.

When one year old the young plants are transplanted in the rainy season to holes dug previously in the ground, and if the tap-root is very long, as is apt to be the case if the plants, as done in some places, are left in nursery till two years old, it is simply cut, leaving it only ten or twelve inches long and letting it bleed profusely before planting it, as it is said that the clogged milk impedes its taking root quickly. Transplanting without cutting the root is however preferable, as is also transplanting "en-pilon" that is with the lump of earth surrounding the roots; but this is not always practicable when transplanting to a long distance. Cuttings are very seldom planted, and seem not to give good resnlts.

As for planting in the sun or in the shade, there are different opinions as to the proper course. Some claim that they ought to be planted in the forest in the shade of other trees, and that the sun hurts its milk-production, makes its rind thicker and prevents its growing old and strong. The other side claims that the young trees planted in the sun grow much more vigorously than in the shade, and that not only the greater facility and convenience in looking after the plantation, but also the actual increased growth favors plating in the sun. It is rather difficult to decide which is true in the absence of large old plantations formed on both plans, but I for my part am of the opinion that it depends greatly on the climate of the locality where the plantation is made, for whereas on the Pacific Coast and part of the Atlantic coast there is a long dry season, sometimes fully six months during which the sun may inflict somo damages on the trees and where consequently shade would be preferable, in other places as for instance on my own plantation there are rains in ten months or more in the year, and the moist atmosphere consequently prevents the sun from damaging the vitality of the trees, and especially if the altitude is from 200 to 500 meters over sea-level, as on my place, where a heavy shade would not be beneficial to the trees, since they would not get the necessary heat, and this is borne out by the fact observed by myself, that the young trees planted in the snn grow much quicker and stronger there than those left in the shade. Several planters in the State of Chiapas, however, claim just the opposite resnlt, their plantations heing sitnated almost at sea-level and farther south than mine. On the other hand I have seen a plantation of yonng trees grow nicely at a height of over 700 meters altitnde, but these I am inclined to think that the ahsence of the necessary heat may have an adverse influence on the latex of the grown tree. I have fonnd that lime and green mannre seem to help the growth of the trees very much.

The distance hetween the trees varies much. Some give them as much as 20 feet, bnt the average seems to be 15 feet. Some few give only 12 feet bnt without planting anything else between the trees, and a few are trying the Trinidad system of planting at 8 to 10 feet only, intending to uproot and thoronghly bleed one half later. Of course, in selecting the distance, the quality and configuration of the soil and the climatic conditions have all to he taken into consideration. Where the gronnd is very wet and inclined to form pools, it seems advisable to follow the system of forming a hill around the foot of each tree, as, contrary to the "Hevea" excessive moisture and swampy land seem to hurt it.

I do not think the Castilloa Elastica onght to be tapped till in its eighth year to avoid injuring the tree, nor do I think that planters onght to effect snch fabulous yields as five or more pounds a year, as some enthusiasts promise. Here we generally make the safe estimate of one to two pounds of rubber per year, and rather the former than the latter.

Plumbago.—We have received copy of a valuable paper on "Graphite: its formation and manufacture" by a competent scientist, which will be given in full in our *Tropical Agriculturist.* It is curious to read that the only difference between the diamond and graphite—both being carbon—is one of *pressure,* the former being the result of high, and the latter of low, pressure. A formula we have already published runs:—(1) Diamond, (2) Plumbago or Graphite, (3) Amber, (4) Coal, (5) Peat, (6) Petroleum.

The Camphor Monopoly in Formosa.—A Taipeh correspondent writing to a Hongkong paper on 29th June says:—

Preparations for the operation of the camphor monopoly law, which will come into force on the 5th August next, are now in progress, and it has been announced that six camphor offices will be established, namely at Taipeh, Tekcham, Miori, Taichu, Rinkeho, and Giran. It is the intention of the Government to improve the present method of packing by making the chests of pine instead of camphor-wood as hitherto and lining them with zinc, so that the contents can be kept for a long time without loss by evaporation. If all the stills now in use are well managed they have a capacity of turning out some 150,000 piculs a year, while the world's consumption is roughly estimated at forty or fifty thousand piculs only. The Government therefore intends to greatly decrease the present number of stills so as to keep a fair proportion between demand and supply and to ensure a fair price for the drug. As regards the manner in which the Government will sell its camphor nothing definite has been decided, but according to a competent authority the Government will not sell the drug at all for the present but will allow an interval of six months or a year to elapse, when it is anticipated the article will fetch three times the price paid for it to the producers. Owing to the importance of increasing the general revenue to make it balance the expenditure the Government, it is stated, desire to get a million yen out of the monopoly.

A VISIT TO THE RAJAKADALUWA COCONUT PLANTING DISTRICT.

THE YEARS' EXPERIENCE OF COCONUTS.

CHILAW RESTHOUSE is placed in an exceptionally healthy situation, on a rising bank facing the sea, and it is neatly and substantially built; but with an entire disregard of ventilation in respect of the bedrooms. Either window or door must be left open at the risk of thieves, or closed with a lack of fresh air. The Malay resthouse-keeper, who has had eight years' experience, is one of the best managers in the country, second only, perhaps, to the veteran at Negombo who has had 23 years' service, but is still the active, bright, intelligent Sinhalese he has always been from Sir Charles Layard's day onwards and yet only an Arachchi when he ought long ago to have been made a Muhandiram! Mr. Ellis, however, cannot overlook so faithful a servant—since he has known him since he (Mr. Ellis) was a young Police Magistrate at Negombo.

On the long creeper-covered, sandy, backwater bank in front of the gaol, resthouse and other buildings at Chilaw, an interesting experiment is being made in growing coconuts, shelter being provided. This shelter is indispensable in the South-West monsoon, as the difference between trees in front and behind the resthouse will show; but I am surprised the experiment does not extend to palmyras which would probably suit the soil and climate better, judging by the splendid clump of mature trees in one corner. Has any European planter in Ceylon ever gone in for

A CLEARING OF PALMYRAS?

I suppose not; the greater number of years than in coconuts, required to arrive at maturity, being a deterrent. But certainly the experiment ought to be made around and North of Chilaw. Mr. Martin, the leading Proctor (and son of honest John Martin, who with Carry and Lamont was long the best known of Negombo and Chilaw planters), has a good opportunity of making a fine avenue of palmyras on his plantation property stretching from the town to the Deduruoya.

Very delightful is the early morning—between 5-30 and 7-30—for a drive along a good road in this comparatively dry coast region of the island with the South-West breeze blowing. In 1895 I found Mr. Ingles, of the Survey Department, busy with his celebrated triangulation tower in front of Chilaw, and it was a coincidence that we should meet here again, Mr. Ingles meditating the erection of another tower after a permanent form to serve for observations, the top of the lofty and widely-known Chilaw R.C. Church (which Capt. Donnan and other mariners utilise) being now rendered unfit for triangulation purposes. Mr. Ingles was always one of the most active, and he has now become one of the more experienced, officers of his Department; and it was a pleasure to note his enthusiasm over the work going on in the triangulation, as well as in cadastral and topographical departments. His colleague, Mr. T. Hampton—son of an old friend, the late Mr. J. L. Hampton, so long proprietor of Penrhos and Hentleys estates—is busy with "boundaries and applications," the distracting work for which the Surveyor-General thinks a separate staff ought to be provided, so as to have his trained men free to go on uninterruptedly with the responsible undertakings now entrusted to them. Early as was our start northwards to Rajakadaluwa, it was not too early for industrious Tamils to be out attending to herds of cattle dotted over their

TOBACCO GROUNDS

for manuring purposes. All is fallow or in the rough at present; but to the extent to which manure can be got, this tobacco is cultivated freely, and is one of the most paying of industries. Why does not an artificial manure maker try an experiment on a Chilaw tobacco field—an acre would not involve much risk, and the object lesson that would show an artificial mixture to give better results than cattle manure, would attract universal attention. Nor would an experimentalist require to go so far afield as Chilaw: there is quite a large number of tobacco fields cultivated by Sinhalese North of the Mahaoya near Nyamadenai.

The road to the

DEDURUOYA

and beyond, is in much better order than in days of old. Mr. Simmonds, who built the bridge in 1894-5, is, I understand, still in charge of the district—left here, I am told, because he is supposed to be fever-proof! Be that as it may, he has made many improvements in the numerous small bridges or culverts and in general attention to his roads. His big river bridge is ready for a 2½-feet gauge light railway, and we had full evidence in a succession of crowded passenger coaches starting thus early for Puttalam, of plenty of traffic being available. The Deduruoya is a strange river; you never know where to find it! It has shifted its course greatly in the four years and so concentrated its full force against one end of the bridge that a series of wooden breakwaters had to be formed with piles to check the rush of floodwater in washing out the bank and perhaps the foundation! Between Chilaw and Rajakadaluwa, over six miles, there is far more evidence of life and cultivation than we can recall on our first visit ten years ago. There is an almost continuous line of gardens or plantations, frequent boutiques or bazaars, where all was loneliness in the "eighties," and where a cheetah quietly crossing the road in front of one's bullock cart was an ordinary afternoon's experience a decade back.

Plantain and coconuts are the favourite products, and I am told the whole roadside via Battuluoya to Puttalam is now fairly well occupied.

But I have to do with

RAJAKADALUWA

district and its 25 coconut plantations and gardens covering some 3,500 to 5,000 acres of planted land from the new clearing to fields 14 to 15 years old—from Amalgamated Tea Estates Co.'s (Messrs. Finlay, Muir & Co., Agents) Nellunkuliya of 400 to 500 acres with regular work for 200 labourers down to the

garden of 30 or 40 acres. There is, moreover, quite a group of Sinhalese villages with thousands of population scattered throughout the neighbourhood, who have benefited greatly by the money spent in planting coconuts; although more than half the permanent workers—perhaps two-thirds—are immigrant Tamils.

The pioneer of Rajakadaluwa was the late Mr. G. D. Miller, who originally came to Ceylon under the auspices of the Eastern Produce and Estates, or rather of the then Ceylon Co., Ld., and had experience as a coffee planter in Matale, before (while visiting Horrekelly) he became interested in the country North of the Deduruoya for coconuts. He got his land on the roadside at upset price and made a good start, though he was inclined, perhaps, to take too much out of the soil in plantains, and though he made a big mistake by planting his first clearing too close, the palms being four to six feet too near each other. What a difference this makes (the common practice in nearly all native gardens) was never better illustrated than in neighbouring fields—close and wide planted—on Mr. Miller's place: the trees are well grown on both, but the bearing qualities of the palms are vastly different. We first heard of Mr. Miller's pioneering work in 1887; and looking out at the time for a Coconut investment for relatives in England, we allowed him to purchase two lots, aggregating 166 acres, adjoining his own Rajakadaluwa which, with fees, &c., cost R2,125. This was called by one of the lady proprietors

TOYNBEE

(after the well-known philanthropist who gave the name to Toynbee Hall, in Whitechapel) and for its size and age (after a good many vicisssitudes) it is now one of the show coconut places in the district. Mr. Miller did good work in opening and planting Toynbee—though taking too much out in plantains for our taste—for two or three years; then he lost his health—a great deal of fever prevailing at times, especially while the soil was being turned and opened for planting—and during the last period of illness and our absence on furlough in England, the Toynbee fields got terribly neglected; and after poor Miller's sudden death from fever in Colombo hospital, there had to be a large expenditure to meet, in order to retrieve the mischief done, while the plantain contractor had bolted, leaving some R1,500 unpaid for fruit harvested by him! The first operation was to clear out all the plantains, make trenches and bury the stems, which, no doubt, both as an act of cultivation and means of nutrition, did much to benefit the young palms; but the number of supplies required was disheartening; and not till 1895 was there much pleasure in looking at Toynbee. Unfortunately "iluk" grass had been allowed to get in at one or two corners; and poor Miller's place became so neglected after his death, that some parts became a breeding-ground for beetles which swarmed over to adjacent plantations. Weeding, clearing stumps and logs and burning, and beetle hunting were, however, vigorously pursued, as well as careful supplying and the change wrought during 1895 and succeeding years under the careful direction of an experienced Negombo planter, who put conductors on the place and supervised them by periodical visits, was wonderful to see. Better or more economical work no property has ever had done for it. One thing for which credit may well be taken was the number of trees, supposed to be fatally injured by beetles which were saved by the complete cauterizing and scooping out of the part attacked, and then tarring the inside—so that now there are palms to be found with a full crop of nuts, whose hearts, for two or three feet, are all gone—whose sides in fact look as if someone had, for pleasure, cut out the figure of a canoe, leaving but a shell in half the stem. Nevertheless, this shell is found sufficient to sustain a vigorous growth and mature a good crop of nuts, and now there is not a beetle (or beetle's work) to be seen, unless a stray one should come over the high fence from where there may still be neglect and decay. Less success has attended the eradication of the "iluk": it is a most persistent, detestable weed and has cost from first to last an extraordinary outlay; but there is good hope that 1899—after a seven years' campaign—will see the last of it.

Mr. Jardine visited Toynbee during the first year and again two years after: his report was all that could be desired as regarded the immediate prospects and he made it clear that the place had a wonderful preservative against drought, in the brackish damp subsoil, which seemed to indicate that this region is the old site of a backwater, the land rising between it and the sea. This has been proved to be correct by experience; for the palms never droop even in the most prolonged drought. But Mr. Jardine—we may now mention—in 1888 and 1890—doubted

THE "STAYING" QUALITY

of the soil,—in other words, if it had substance enough to carry the palms to a healthy full maturity and give crops for many years. So far as it went, in its mixture of humus and brackish sand, it was perfection for young coconuts; but "How long would its sustaining powers continue?" was his question. Undoubtedly cultivation and the digging in of an extensive area of plantains, must have improved and strengthened the soil; for another "coconut" veteran, Mr. W. H. Wright in visiting and reporting at the end of 1895, though by no means prejudiced in favour of the district, after a very careful inspection and examination of the soil in the different fields of Toynbee, gave a most hopeful report on the prospects of the trees and plantation, if only justice were done in careful cultivation and, by-and-bye, in judicious manuring—which, of course, was also Mr. Jardine's panacea for the deficiency he feared.

No product—as old W. B. Lamont has well said, laying down the law 30 years ago, —no product in Ceylon responds to, or repays, so well for

MANURING, AS THE COCONUT PALM;

but few proprietors, we should say, will care to incur a cent of outlay in manure, artificial or otherwise, so long as there is no crop of nuts. Let something first be harvested, in the shape of crop, and surely then it is

time enough to call out for a little outlay on manure. For nine weary years, it was all expenditure on Toynbee without a cent of return. We are not at liberty at present to quote figures of outlay; but we may shew how the

CROPS OF NUTS

have increased since the trees began to bear. The seasons count from July to June and in 1895-96 came the first pluckings worthy of notice aggregating a crop of 33,788 nuts (22 nuts were gathered in June 1894, and 1,541 between that month and May 1895). The oldest trees were under 7½ years at the end of season 1895-6. The rise then may be given as follows:—

Season.		Age.		Crop nuts.
1895-6	...	7 years	...	33,788
1896-7	...	8 „	...	108,372
1897-8	...	9 „	...	200,125
1898-9	...	10 „	...	296,000

It is reckoned that little more than 6,000 trees on an average contributed to the last crop giving a return of say 49 nuts per tree; while, altogether, Toynbee should have 10,000 trees and plants of all ages growing, so that a large proportion has yet to come into bearing. But what about the "staying" character of the soil, it may be asked? Well, there is nothing in the appearance of the heaviest-bearing trees (and from some as many as 70 to 80 nuts have been got, in this last May-June plucking alone) to indicate any failure, or approach to failure, in regard to means of sustenance. The palms are all green and vigorous, although with few exceptions—to be noted hereafter—they have had little or no manure. One evidence of the neglect and suffering of 1891-2-3 is very evident throughout one or two fields in the irregular stems of the palms—the shrinking and less circumference noticeable at mid-height, no doubt indicating the check and loss of proper feeding which they sustained during the years when the plantains were allowed their own sweet will, as well as the weeds and beetles. Nevertheless, Toynbee, as a whole, is a most encouraging picture of a ten to eleven year old

LOWCOUNTRY COCONUT PLANTATION,

covering, we may say, 166 acres, all planted. It is by no means such a model of neat, almost perfect cultivation, as is Mr. W. H. Wright's far-famed Mirigama estate; but in crops, we suppose, it will, so far, compare with any plantation, we, at least, have ever heard of, with authentic crop returns in Ceylon. Still, let no one suppose that anything like big *net* returns are even now being got by the proprietors. The accounts have not yet been closed; but even with a crop of 300,000 nuts from, say, the equivalent of 100 acres, the outlay on the whole 166 will not leave

A PROFIT

exceeding R25 per acre probably, which would be laughed to scorn by certain of our "tea" friends with their R100 or even £10 sterling per acre of profit.

But there should be a future before Toynbee, more especially now that the era for

MANURING

has arrived. This was begun in November 1898 on certain selected plots of about four acres each, in different fields—two plots to each kind of manure and six plots in all. First, we have an artificial manure—"Baur's special fertiliser"—6 lb. per tree being applied in two marked plots (situated in two different parts of the estate); Second, another but even stronger (in nitrogen) artificial preparation from Mr. Baur (who owns the adjoining fine Palugaswewa coconut property), of 4½ lb. per tree and this was applied on two plots under similar conditions; while, Thirdly, 3 lb. bone-meal and 6 lb. castor-cake per tree were applied over exactly similar plots. No examination of results or proper comparison can be made, it is thought, much under two years from the time of application. Some useful data ought then, however, to be available, as the crop for each plot (number of trees and yield) is being carefully recorded.

The only other manuring attempted was over a few acres by village cattle, two or three years ago; and in 1896 ten ewes and a ram were secured as the beginning of an experiment in

SHEEP

manuring. These bred up to 50 (besides sales of several rams at about R9 each*) when an epidemic broke out and reduced the stock to 35. The great advantage is that sheep do not touch young coconut plants, while they keep down grass, cost nothing; but the herding, and, of course, their manure was of service. Now, however, that nearly all the supplies are out of danger, it is intended to begin a stock of Sinhalese or cross-bred

CATTLE

getting up to 60 or 70 head from a nucleus of a dozen, as there is really good pasture between the rows of palms and a couple of cattle can be reckoned to manure effectively an acre quite in a year. It will be instructive to watch the result over 20 or 30 acres, and compare it with the plots artificially treated.

One curious feature in Toynbee is the exceptionally numerous bunches of nuts on the young trees which require

TO BE SUPPORTED BY FORKED STICKS

with the other end pointed and fixed against the stem of the tree. Quite a constant work this has become for two or three Sinhalese men, and blame is cast on Mr. Miller for not leaving one or two acres of jungle from which such sticks could be cut, in place now of having to buy the same—a warning to other young planters! As the trees get older, it is expected they will be able to bear their heaviest bunches unsupported. Everything points to estates in the Rajakadaluwa district being in their prime between their 15th and 18th years. Unfortunately the oldest (Mr. Miller's place) which

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* Mr. Wright of Mirigama presented Toynbee with one of his young cross-bred rams which, developing a tremendous pair of horns, has become rather a nuisance through his love of constant butting, none of the others being, of course, able to stand against him!

is about the former age, cannot be taken as a fair test, through a large part being too closely planted and most of it being neglected; at any rate there has been an absence of proper cultivation for the past eight or nine years. Still, it is wonderful how, in spite of little being done for the palms, they go on cropping on this place and the story of their dying out, except it be when young from beetles, is not correct.

We do not say that crops on Toynbee are to go on increasing after the rate of recent years per tree; but if present appearances continue, there is no reason, we suppose, why the proprietors should not count on a crop of 550,000 nuts by 1904, and perhaps of 750,000 nuts when every one of the 10,000 palms is in full bearing. How long should such crops continue? That will depend on careful cultivation and judicious manuring. Meantime, the little place along with its neighbours has been

A BLESSING TO THE PEOPLE

of the district and of many immigrant coolies. The money spent during the past fifteen and especially the past six, years has enabled the Sinhalese to live far more comfortably than ever before. The

MESSRS. DE MEL

have three fine, young and extensive coconut plantations—one on each side of Toynbee—and all promising exceedingly well. On a young place, Karukkuliya (Mr. Manuel de Mel's) which we inspected, the planting has been most carefully attended to, and the plantain cultivation confined to a square in the centre space where it could not possibly injure the young palms. Wilpotha plantation (belonging to Mr. Jacob de Mel and his son-in-law, Mr. Barrister Pieris) under the skilful management of Mr. Edward MacCarthy, is older than Karukkuliya (two or three years younger than Toynbee) and promises exceedingly well, having 300 acres planted with 100 more to go in this year. It is a very valuable property. Mr. Baur has some 400 to 500 acres planted at

PALUGASWEWA,

the oldest field a year younger than Toynbee and which must prove a very valuable property. Still further inland, Messrs. Finlay, Muir & Co. are covering some 600 acres with the palm on Nellunkulia, under the experienced direction of Mr. Jardine as Inspector and Visiting Agent. Then there are the properties of Messrs. Mason and Manchip (being much improved under the latter's care), of Mr. H. J. Pieris, of Mr. Muttiah, of Mr. de Soyza, of Dr. Hallock, etc. Altogether there are 25 estaes, employing 1,200 coolies and covering 5,000 acres, perhaps, and the district altogether promises well. The feverish time of the year in the older properties is confined to November-December when the malaria-laden land-wind makes it very trying for coolies and Superintendents. The proprietors have been anxious this year to get the Government to open a Dispensary; but Dr. Perry thinks Battuluoya—half-way between Chilaw and Puttalam—the proper site. Rajakadaluwa, however, should have a

DISPENSARY

of its own to serve 1,200 to 1,500 of a cooly population and some 3,000 villagers. A few of the leading proprietors could readily erect a residence and dispensary and guarantee a salary, provided the supply of medicines was got free; but then comes the question whether coconut plantations so far north—even when employing immigrant coolies—come under the privileges granted in the tea and cacao planting districts? This must

be inquired into. Here is an estimate done up by a resident planter:—

The undermentioned are the estates which would be directly benefited by a Dispensary at Rajakadaluwa:—

	Coolies.		Coolies.
Toynbee	50	Adv. Chitty's	10
Jacob De Mel's (Wilpotha)	70	Samarakoon Mudaliyar's	25
Miller's	40	Jacob De Mel's (Paniadikulam)	40
Manuel De Mel's (Karukkuliya)	15	C. P. Silva's (Johanawatte)	20
A. Baur's (Palugaswewa)	150	Messrs. Finlay, Muir & Co.'s (Nelunkullia)	200
Muttiah's	50	Messrs. Mason and Manchip (Sitamadama)	30
U. D. S. Gunasekara's	30	Dr. Hallock's	50
H. J. Pieris's	100	Seena Moona Shagoo Varusay's	50
S. G. Perera's	25	Ana Kana Modelali's	25
P. Fernando's	25	Varusay Modelali's	15
J. J. Lorage's	5	Goonoo Saiboo's	10
C. De Soysa's	40	Don Juan Appu Rendaràla's	30
Manuel De Mel's	50		

The time, too, has come when there ought to be an extension of Tamil Cooly and Sinhalese Itinerating Missions to the district and schools opened for the children. There is one Sinhalese grant-in-aid school at Karukkuliya, close to Rajakadaluwa, but no Tamil school yet.

Turning back to Toynbee, we should give a word to the convenient

COPRA DRYING HOUSE AND BARBECUE

—capable of holding the copra of 25,000 nuts, or 24 candies—a model erection for the rest of the district—the fuel being coconut shells (heat without smoke); copra store and drying ground. When the last is extended, the hope is that all the drying of copra can be done in the sun, so saving any discolouration. Hitherto, the nuts have been sold about equally to the Agents of the Horrekelly Desiccating Mills, and for the manufacture of copra, in both cases, the purchaser, after carefully checking, and rejecting perhaps, five per cent of a plucking of nuts as too small, light, empty or otherwise deficient—dries his copra or removes the nuts to the mills, leaving the husks on the estate. These latter are being utilised freely as surroundings for plants as also for filling up trenches.

The boundaries are generally marked by a

SAPANWOOD

fence which, perhaps, grows too freely, interfering sometimes with the first line of coconuts. We intended in the early days getting Mr. Miller to make a substantial experiment with American cotton and sent him some fine

seed; but we can only trace one surviving plant, also with "kapok," and of this there are some handsome rows of trees.

THE CHANGE.

The change in the appearance of the coco-palms and other trees in $3\frac{1}{2}$ years, since our last visit, is very great. In 1895 even, a planter then resident in the district, we now hear, declared that Toynbee was only fit for a fire-stick, with its beetles and weeds! This gentleman ought to see it now. Another younger man, after a short time in the district has been spreading reports that it is no good for coconuts as trees die out before getting to maturity. We have been unable during the present visit to trace any cases of the kind even on Mr. Miller's neglected place. As regards the district, as a whole, no doubt, the building of the

DEDURUOYA BRIDGE

has had its effect in development since 1895. We can recall the inconveniences and occasional dangers of the old ferry, between 1888 and 1894. But this development is not confined to Rajakadaluwa, but extends right along the road to Batuluoya and even to Puttalam. Given a light $2\frac{1}{2}$-feet gauge railway, and there is no question that very soon after its opening, a continuous scene of prosperous cultivation such as now marks the region from Negombo to Chilaw, would cover the whole 30 miles from

THE DEDURUOYA TO PUTTALAM.

Whether we may see cultivation arise alongside the broad-gauge Northern line in a certain number of years is a hard question to answer—at least for 50 out of the 80 miles between Kurunegala and Anuradhapura, if we are to judge by what planters, surveyors, road-officers and sportsmen tell us. However, for the first time in its Railway policy, the Government has chosen to leave the line of population and traffic and to construct a line through poor, unoccupied country,—the responsibility of this course is mainly with the local authorities while that of the broad-gauge employed rests with Mr. Chamberlain. The Colombo and Puttalam $2\frac{1}{2}$-feet line (in connection with the Kelani Valley line) when it comes in the early part of the next century(?) will be found one of the most successful Railway Extensions in Ceylon and will help to make up for financial deficiencies elsewhere.

THE CLIMATE OF RAJAKADALUWA

is undoubtedly a dry and hot one: a rain-gauge has only just been established on Toynbee; but the estimate is of an average annual fall of about 60 inches, but this is aided by the moist character of much of the subsoil. The temperature can be very considerable; but the hot season is not unhealthy,—that is reserved for the land-wind (malarial) months of November and December.

Speaking of the great benefit to the local villagers which the employment afforded by a new series of plantations confers, we are reminded of the great similar benefit derived from the establishment of

DESICCATING MILLS

in our rural districts. To Messrs. Vavasseur & Co., the Colony is indebted for first introducing this new manufacture and industry, as also, we believe, for pioneering with the shipment of bristle and palmyra palm fibre, and of whole coconuts on a large scale from Ceylon. Their Colombo Mills was the first and largest for desiccating purposes and they have now established Mills at Lunuwila on the North of the Mahaoya, giving employment to some 1,200 men, women and children; and spending money amongst them, which is changing the face of the villages and their surroundings (where the people keep from arrack drinking). Then this is true also of the

ORIENT COMPANY

with its Veyangoda Mills, and now with its second venture so far North as Horrekelly; while the Ceylon Tea Plantations Company has its Mills at Hunupitiya, near Negombo. Altogether, we may suppose some 6,000 natives to be directly interested in these ventures; besides the large indirect number engaged in carting, buying nuts, etc., etc. All success to our CEYLON DESICCATING MILLS.

CACAO SOILS.

ANALYSES FOR TRINIDAD AND CEYLON.

We are greatly indebted to Mr. Cochran for sending us remarks on certain Analyses of Cacao Soils which have reached us from Trinidad, and still more for supplementing these with analyses of certain Ceylon Cacao Soils. Professor Carmody in Trinidad, after analysing no fewer than 23 samples, had a difficulty in making up his mind about them, so that Mr. Cochran may be pardoned if he is not dogmatic about the results in the two cases on which he has worked. Still, there are certain well-marked features which appear prominently and we feel sure Mr. Cochran's paper will be read with interest by all our cacao planters:—

I have now pleasure in sending you a few remarks on the analyses of cacao-soils made at the Government Laboratory, Trinidad, and published in the "Proceedings of the Agricultural Society" which you were good enough to send me recently. These are analyses of soils said to be of *average* fertility. It may be well, therefore, first to refer to another set of eight analyses of cacao soils from various parts of the West Indies made at the Government Laboratory, in the year 1897; as these, we were told, were types of really fertile cacao-soils. The report on them was to the effect that, "as a rule, these fertile cacao-soils are rich in nitrogen, and contain a somewhat high amount of potash, of which a relatively high proportion was found to be soluble in 1 per cent citric acid solution, whilst the proportion of phosphoric anhydride seems to be of lesser importance. They can, we consider, be safely regarded as reliable types of the composition of really fertile cacao soils." In another part of the report it was stated "we are led to the conclusion that a good cacao soil should be one capable of yielding to the tree in the course of years a somewhat high proportion of the important constituents of plant good without exhaustion, and also capable of rapidly rendering again available

the huge quantities of manurial matter returned to it in the form of prunings, leaves, fallen and broken pods. It must, in addition, be one, in which the course of nitrification readily takes place ; in other words, a fairly rich, friable and well-drained soil."

Instead of quoting in full the analyses of the eight samples of fertile soils, I shall simply indicate the range of some of the significant constituents of the soil, and state the average amounts of the more important of these present :—

FERTILE CACAO SOILS.

		per cent.		per cent.	Avge. p. c.
Water retained in air-dried soil ..	From	1·8	to	14·3	8·650
Organic matter and combined water ..	do	3·046	,,	10·993	
Oxide of Iron ..	do	3·910	,,	18·672	
Alumina ..	do	2·038	,,	17·140	
Oxide of Manganese...	do	·127	,,	·435	
Lime ..	do	·356	,,	4·981	1·695
Magnesia ...	do	·217	,,	3·367	1·276
Potash ...	do	·118	,,	·619	·300
Phosphoric acid ..	do	·044	,,	·293	·118
Chlorine ..	do	nil.	,,	·007	
Nitrogen ...	do	·100	,,	·309	·236

These figures show that these soils are characterised by a high percentage of lime, magnesia, potash and I may add, nitrogen; as only one of them has less than ·2 per cent of this substance The amount of phospheric acid in most of them is rather low. In five out of the eight samples it is under ·1 per cent. The one, however, which contained the largest amount of phosphoric acid was a sample from Nicaragua, and is described by Mr. J. H. Hart F. L. S., who supplied the sample, as a very fertile soil. Mr. Hart also vouched for the high fertility of a Trinidad sample, which contained only ·084 per cent of phosphoric acid.

The water retained by the air-dried samples varied to a great extent, viz., from 1·8 to 14·3 per cent. As some of these differences could not be explained by chemical composition only, they must be due to a considerable extent, to a different state of division of the soil-particles.

The amounts of chlorine in the samples are so low, that in two cases the chlorine is recorded as "nil," and in five cases as "traces" only, and only in one sample is there a numerical expression of the amount. All the samples contained appreciable amounts of oxide of manganese.

Professor Carmody, the Government analyst, considering that the data collected with regard to cacao-soil analysis was insufficient for anything like a classification of these soils according to their chemical constituents, had an offer, or rather the second offer, made through the Agricultural Society to estate owners, to the effect that samples of cacao-soils sent to the Government Laboratory would be analysed free of charge. Professor Carmody was anxious not only to be furnished with fertile soils; but with soils in which the cultivation of cacao had been unsuccessfully tried. The report of the analyses you have just sent me is that on the samples sent in response to this second invitation. There are 15 analyses in all, one of which is specially referred to and marked "Venezuela good soil." the others are regarded as soils of average fertility.

Professor Carmody's report on these analyses is so brief, that I may quote it in full. It shows that he still requires more data before he can draw general conclusions from the analyses :—

Government Laboratory, Trinidad, April 28, 1899.
The Secretary, Agricultural Society.

SIR,—I have the honour to forward the results of the analyses of samples of cacao soils sent by members of your Society, in response to an invitation from this department.

In requesting your members to forward samples, the main object in view has been to obtain not only good soils, but also those in which cacao has refused to grow, or to give satisfactory results. The Trinidad soils sent are ordinary cacao-soils of average quality, but I hope that now a larger number and variety of soils will be sent, and will include some bad cacao soils.

General conclusions drawn from the results of the analyses of a few samples are not safe; and, at present, I would simply direct attention to the comparatively large proportions of lime, magnesia, potash chlorine and nitrates in the Venezuelan soil, which is said to yield cacao of excellent quality. The small proportion of phosphates and total nitrogen it contains are also worthy of notice.

My long absence in England during last year contributed to the delay in completing these analyses, which have been made under my supervision by Dr. Ince, Assistant Government Analyst.—I am Sir, your obedient servant, P. CARMODY, F.I.C., I.C.S.,
Government Analyst.

Here again, instead of quoting the 15 analyses in full, I shall indicate the range and average amounts of several of the constituents of the 14 soils of average quality, and I shall quote in full the analysis of the Venezuelan soil specially referred to as yielding cacao of excellent quality :—

CACAO SOILS OF AVERAGE FERTILITY.

		per cent.		per cent.	Average per cent
Water retained by air-dried soil ..	From	1·040	to	9·48	5·048
Loss on ignition ..	,,	2·870	,,	9·00	
Oxide of iron and Alumina ..	,,	4·410	,,	14·920	
Lime ..	,,	·084	,,	·700	·309
Magnesia ..	,,	·076	,,	·493	·264
Potash ..	,,	·114	,,	·267	·217
Phosphoric acid ..	,,	·096	,,	·237	·156
Chlorine ..	,,	·004	,,	·009	
Nitrogen ..	,,	·067	,,	·165	.111
Nitrogen as Nitric Acid ..	,,	·0009	,,	·00335	·00175
Readily available potash and phosphates—					
Potash ..	From	·059	to	·1698	·115
Phosphoric acid ..	,,	·049	,,	·104	·0767

If the foregoing two sets of figures are gone over, it will be found that, in all important ingredients save phosphoric acid, the fertile soils are distinctly the richer, whether we take the minimum, maximum, or average figures ; whereas in the case of the soils of only average quality, the minimum and average amounts of phosphoric acid are higher to a marked extent than in the more fertile soils. This is not a little puzzling, and, indeed, before accepting this result, one would fain have the assurance of the analyst or analysts that the same analytical process was followed in both cases as otherwise the results are not strictly comparable. In the second set of analyses, the analyst has gone to the trouble of making two determinations of potash and phosphoric acid, with a view to form some idea of what proportion of these two substances is readily available. Roughly speaking, the readily available is about half of the total, according to these results, but this does not help us to account for the apparent anomaly of the more fertile soils being poorer in phosphoric acid than those of average quality, seeing that the minimum readily available phosphoric acid in the average soil is higher than the minimum total in the more fertile soils.

Supposing the samples to be fairly representative of the soils and the results of the two sets of

analyses to be strictly comparable, the legitimate conclusion is that the minimum amount of phosphoric acid in the fertile soils viz. ·044 per cent is still so much above what is required for the immediate future, at least, that it is just as capable as a higher proportion of meeting the wants of the cacao-trees; and, certainly, if we go into the calculation of the ratio of supply to demand in the case of the minimum amount of potash and the minimum amount of phosphoric acid, we find that the ratio of the supply of phosphoric acid to the demand is much the greater. For the calculation to prove this we may assume that 0·1 per cent of a soil-ingredient to a depth of three feet weighs four tons per acre. The minimum amounts of phosphoric acid and of potash to a depth of three feet, in the fertile soils analysed will thus weigh respectively 3,942 lb. and 10,572 lb. per acre. In my analyses of the parts of the cacao tree, I estimated that, between the ages of 4½ and 9½ years, a year's demand* of an acre of cacao trees was for phospheric acid 13·41 lb., and for potash 78·32 lb. Dividing the supply in each case by a year's demand, we get the ratio in the case of phosphoric acid as 294 times, and in the case of potash only 135 times that of the year's demand.

However, the minimum amount of phosphoric acid was not associated in the same soil with the minimum, but with ·169 per cent of potash.

If the same form of calculation as before is made with this percentage of potash, we find the ratio of supply to demand to be 193, still much below that of the phosphoric acid. Again, if the calculation he made based on the average, or maximum of either the total or readily available amounts of phosphoric acid and potash in the two sets of analyses the advantage in favour of supply of phosperic acid is accentuated. It would thus appear that there is a greater likelihood of potash than of phosphoric acid being deficient in cacao soils.

The following is the analysis of the sample of Venezuelan good soil referred to in the Government Analyst's report:—

COMPOSITION OF AIR-DRIED SAMPLE OF VENEZUELA GOOD SOIL.

Water	10·74
Dry soil	89·26
	100·00

COMPOSITION OF THE DRY SOIL.

a Loss on ignition	7·610
Iron oxide and Alumina ..	6·200
Lime	·594
Magnesia	·782
Potash	·392
Soda	·177
Phosphoric acid	·147
Sulphuric acid	·036
Chlorine	·016
Insoluble silicates	84·046
	100·000

a Containing nitrogen	·071
„ Carbon equal to humus ..	·250
„ Nitrogen as nitrates ...	·00636

READILY AVAILABLE POTASH AND PHOSPHATES.

Potash	·1707
Phosphoric acid	·0820

Why Professor Carmody refers to the proportion of phosphoric acid in this sample of soil as small is not obvious, as the amount is higher than in any of the eight fertile soils, save one. It is, however, slightly below the average of the 14 average soils, with which he is dealing.

As a set-off against tbe low percentage of total nitrogen, it has the highest proportion of any of the fifteen, of nitrogen in the form of nitric acid, thus suggesting that the soil is possessed of good nitrifying power; but the amount of nitric acid found in a soil is not always an index to the nitrifying power. Nitrates being very soluble substances, the rain carries them down in the soil so that tne same soil sampled in different states of the weather would yield differing results on analysis in respect of nitiates.

Warrington and others now employ a process for determining the nitrifying power of soils which is partly bacteriological and partly chemical. It consists essentially in seeding a convenient culture-solution with a few grains of soil and noting by chemical tests at intervals of five days the vigour with which the nitrifying process proceeds after it is started. If the culture solution is not affected, this is taken as evidence that there are no nitrifying organisms in the soil.

In most of the West Indian samples of cacao soil, the moisture in the air-dried earth is higher in proportion to the organic matter and alumina present than in our Ceylon soils. Take, for example, the sample of good soil from Venezuela. Its chemical composition is such as we would associate with about 3 per cent of moisture, whereas it contains 10·74 per cent. The large amount of moisture must therefore be mainly due to the physical condition of the soil.

The high percentage of chlorine referred to in the report on this sample of soil cannot, in view of the very small proportions found in the eight fertile soils, be regarded as an important indication so far as fertility is concerned; but it is of importance as affording a sanction for the use of chloride, that is muriate, of potash as a manure which is a cheaper salt of potash than the sulphate.

I trust Professor Carmody will continue his interesting series of analyses of cacao soils, giving us some results obtained by the analysis of soils in which cacao has failed to grow or to yield satisfactory results.

The following is the portion of Mr, Cochran's report and analyses referring to Ceylon soils:—

Amongst samples of Ceylon soils recently sent to me for analyses, two were Cacao Soils. It may be interesting in the present connection to quote the analyses of these: No. 1 is the analysis of soil from a Forastero cacao field.

No 2 is the analysis of soil from a Caracas cacao field.

The sender of these soils has been good enough to furnish the following description of the fields. "The field where No. 1 sample was taken from has never yielded much cocoa per acre for some reason. The land is steep, and a fair amount of rock in it. The soil is free and deep."

"The soil in the fields from where the second sample came looks much better than No. 1 sample; but the fields have been much longer in cultivation. There are lots of small patches throughout the fields where the cacao has died

* By a year's demand or requirement is meant the plant food appropriated by the annual increment to the trees and by a crop of fruit, *i.e.*, seeds and pod-husks. If the pod-husks were left out of the calculation, as returnable to the soil, the ratio in favour of the phosphoric acid supply as compared with that of the potash would still be much the greater, viz., in the proportion of 337 to 178.

out not from cacao disease. In most of these patches the shade is bad, and, judging from what you say in your report, the trees suffer from want of nitrogen. The land is flat with a stiff dark, brown soil mostly, and has not been manured much for past six years. Where cattle manure has been previously applied, the trees look much better even now."

ANALYSES OF TWO SAMPLES OF CEYLON CACAO SOILS IN THE AIR-DRIED STATE.

MECHANICAL ANALYSIS.

	No. 1. Forastero Field. Per cent.	No. 2. Caracas Field Per cent.
Coarse Earth	60·75	39·25
Fine Earth	39·25	60·75
	100·00	100·00

CHEMICAL ANALYSIS OF THE FINE EARTH.

	No. 1.	No. 2.
Moisture	2·950	3·200
a Organic matter and matter lost by ignition	7·994	5·150
Oxides of iron	6·793	5·855
Alumina and oxide of Manganese	8·021	8·253
Lime	·793	·700
Magnesia	1·130	·632
Potash	·884	·274
Phosphoric acid	·062	·192
Silica, insoluble silicates and matters not determined	71·373	75·744
	100·000	100·000
a Containing Nitrogen	·193	·070

The mechanical analysis shews a great difference in the proportions of fine earth in the two samples, which is sufficiently accounted for by No. 1 sample representing steep land, and No. 2 representing flat land.

The only constituent that is apparently deficient in No. 1 is the phosphoric acid, this deficiency being relatively greater, on account of the small proportion of fine earth in the soil. It is true the proportion of phosphoric acid is decidedly higher than that of the minimum of the West Indian fertile soil; but the Grenada soil, which contained only ·044 per cent of phosphoric acid, had 14·3 per cent of water in the air-dried soil, shewing that the physical condition of the soil must have been very different. In sample No. 1 it is to be noted that the proportion of potash in the fine earth is exceptionally high.

In No. 2, the only constituent that is apparently deficient is the nitrogen or nitrogenous organic matter; hence the beneficial effect observed on this soil from the application of cattle manure. It is to be noted, however, that the nitrogen in this soil, when calculated to dry soil, as in the case of the West Indian Analyses, is fully as high as in the sample of Venezuelan good soil. The phosphoric acid is also higher, but the Venezuelan soil has more potash and a higher power of retaining moisture. The sender of these soils makes no complaint of cacao-fungoid diseases. It would be interesting to know how far the trees on these soils which are well-furnished with lime and magnesia are really free from cacao-disease. All of the West Indian fertile soils analysed are well supplied with lime and magnesia. In two of the average soils lime or magnesia is rather low; but in none of them are both lime and magnesia low.

M. COCHRAN.

HOW TO MIX FERTILISERS.

Fertiliser mixtures, uniform in quality and equal in every respect to the best factory-made fertilisers. can be made on the farm without milling machinery, A tight barn floor, platform scales, screen, showel and hoe are the only utensils needed. The materials having been weighed screened, and lumps pulverised the most bulky stock is spread in an oblong pile from six to twelve inches deep; upon its levelled top the next material is placed, and so on until all have been added like layers on a layer cake. Commencing at one end, the pile is shovelled over, the operator reaching clear to the bottom every time. The pile is then levelled up, and the operation repeated three times. The mixture may then be screened again if desired. In thus mixing his fertilser the farmer knows definitely what he has purchased. Each ingredient can be tested by itself if desired, and inferior materials are not likely to be palmed off on him. He can also vary the proportions of the ingredients to suit the requirements of varying soils.—*Farmer and Stockbreeder.*

THE COLOMBO AGRI-HORTICULTURAL EXHIBITION.

From an early hour on the 21st July, the grounds of the Agricultural School presented a busy scene, the finishing touches to the decorations being all worked off some time before noon. That things were so far forward, as the earliest visitors (the majority of whom were judges) found then this morning was due to the untiring efforts of the energetic Secretary, Mr. C. Drieberg, who has worked with the utmost zeal towards the success of the Exhibition. Exhibits began arriving early yesterday and amongst the visitors then taken round were Mr. Fowler, Acting G.A., Western Province; Mr. F. H. Price, Mayor of Colombo; Mr. Cookson, and Capt. Lowndes, of the Police; to whose plans the efficiency of the police arrangements this afternoon are due. Mr. Nock also visited the School buildings yesterday —ever among the first and, indeed, the most indispensable gentlemen, where a show of our island's products are concerned. Having taken a careful look round in every section we may say that the success of the Exhibition was never quite so marked as this year. In individual sections, more notably the Horticultural ones, there is a regrettable lack of competition. For instance, the Ferns in Pots were conspicuous by their scarcity and those who remember the wealth of "fernery" that adorned the verandahs at the further end of the buildings last year, will have been taken aback today by the want of display in this the most attractive of the finer kinds of greenery. There are numbers of residents in Colombo with excellent ferns in their bungalows, which, for want of a little confidence or enterprise on the part of their owners, might have been seen adding materially to the completeness of the Exhibits. But taken all round, there was a marked improvement, both in quality and quantity of the exhibits. This was seen most especially in local fruits and vegetables, *e.g.* jaks, pumelos, gourds, pumpkins, and brinjals—bananas alone forming a most surprising exception.

But to take things in order. Approaching the Agricultural School down the long avenue, one of

the most charming in the city of Colombo, the eye is caught at once by the splendid pandal that has been erected at the gate. At the top, the figures of 1899 are entwined in a circle and below the inscription reads :—

AGRI-HORTICULTURAL
SHOW

Welcome

TO HIS EXCELLENCY
SIR E. N. WALKER, K.C.M.G.
THE LIEUT.-GOVERNOR OF CEYLON.

Up the drive the road is lined with the slender rustling arches of young coconut leaves, bent over and fixed into bamboo stems. The front of the School buildings are also suitably decorated. Entering one finds the room devoted to food products on the left. Down the whole length of the left-hand side lie numerous collections of paddy, in which article there was evidently great competition. A highly finished exhibit was in No. 6 (Section III.)—a collection of 15 kinds of grain set in an elegant light wooden case. On opposite side the bales of cinnamon (25 lb. each) and exhibits of cacao and of tea in 2 classes (grown below and above 1,500 ft.) are conspicuous. Amongst the bundles of cinnamon, also, one is noticeable from its being enclosed in a carefully constructed wooden case. The variety of native sweets arranged on the table gave the judges a deal of difficulty. One overheard remarks like the following: A.—"A very striking taste!" B—"Rather pungent, though?" A—"Yes, but acceptable to the natives, perhaps." B.—"Oh ! to judge from their point of view,—yes." A.—"I think it should be awarded the prize." B.—"I agree, though I shouldn't choose it for dessert." Along the main and apples from the local Australian stores—bore the happiest appearance. In the first yard on the left were the poultry (Section IV—Class B) most striking of which seemed to be a cage on the extreme left, No. 6—six village-reared fowls—and three other cages, No. 7, of 2 pairs of pigeons reared in Ceylon : in the latter were contained some pretty Fantails (white and black), Egyptian and English pigeons, and Pouters, Jacobins and Nuns. The next rooms, (right and left,) are devoted respectively to Vegetable Products, where picked specimens of coir and other native fibres may be seen, and Arts and Manufactures: here there were half-a-dozen lace women with exceptionally good examples of work on the pillows before them, but the outstanding object was a magnificently carved dressing-table and cabinet, symbolical of harvest. In the centre is Messrs Cave & Co's classic photograph of a single palm by the moonlit-shore—the emblem of the immemorial mainstay of the island's prosperity—while on either side are stout lusty figures, the anatomy of which is so carefully done as almost to fail to attract notice; some minutes' study, however, of the workmanship, of the arms and legs especially, recalled to us the classic casts of the Louvre in Paris. One or two ebony exhibits showed the most finished chiselling and shaping, but the central piece we refer to was a real creation of mature thought, and a design achieved with remarkable success. A fine ebony cabinet too should be noticed. There were some splendid bulls among the cattle exhibits ; but the gem of these was a tiny little bull, calf with silver caps on its horns, and scarcely higher but not less proud than the little eight-year-old podian who stood beside it. The Horticultural Room was the chief centre of attraction this afternoon. There were three exhibits of high quality for the Gold Medal, and the award gave general satisfaction. Most charming perhaps in the whole room, however, was the single exhibit of six orchids, the mauve Dendrobium Phalenopsis and Catteleya Bowringiana taking the palm for delicacy of colouring and form. Of the Cannas, the *Papa* and *Allemania* showed magnificent blooms, adding materially to the colouring of the radiant display. The ceiling of the room was decorated with greenery and festoons at the junctions of which hung bouquets of blossoms. A large porch-pandal had been erected at the entrance to this, the Flower Section, and the pillars were entwined with spirate greenery. It was here that His Excellency was to alight this afternoon at 4-30 p.m., thereby signalling the opening of the Show. Below will be found the list of Judges, Exhibits and Awards, a Silver Medal being understood in the latter list (which is complete all but about a dozen awards) where no specific mention of a prize is to be found.

LIST OF OFFICERS.

The following are the officers for the show :—

Patron: His Excellency the Governor. President: His Excellency the Lieut.-Governor.

COMMITTEE.

The Hon. F R Ellis (Chairman); H.E. Major-General Hobson, the Hon. Justice Lawrie, the Hon. Justice Browne, the Hon. F R Saunders, the Hon. H L Wendt, Sir Harry Dias, Mr. F Beven, Mr. P Coomaraswamy, Mr. C Drieberg, Editor "Dinakaraprakasa," Editor "Sarasavisandaresa " Mrs. F R Ellis, Messrs. J Ferguson, W H Figg, J C Huxley, F G A Lane, F C Loss, S D Mahawalatenne, Jacob de Mel, W Nock, S C Obeyesekera, James Peiris, Henry A Perera, F H Price, J Clovis de Silva, W A de Silva, G W Sturgess, H VanCuylenburg, J C Willis and Dr. Vandort. Hony. Secy. Mr. C Drieberg.

COMMITTEE OF MANAGEMENT.

The Hon. G M Fowler, (Chairman), Messrs F H Price, W Nock, H Macmillan, P D Siebel, T Sammugam, E C Davies, J W Vanderstraaten, James Peiris, Henry A Perera, A FBroun, H T S Ward. Hony. Secretary and Treasurer: Mr. C Drieberg.

The gathering this afternoon was a very large and representative one and among those present were:—Mr. F. H. Price, Mayor of Colombo, Mr. and Mrs. J. Ferguson, Mr. and Mrs. W. E. Davidson, Mr. W. T. Pearce and Miss Pearce, Mr. and Mrs. S. C. Obeyesekera, Mr. and Mrs. H. L. Daniel, Dr. H. M. Fernando, Mudaliyar John F. Perera, the Misses de Mel, Mr. H. J. Soysa, Mr. W. M. Soysa, Mr. and Mrs. Arnold Dias, Mr. and Mrs. Tudor Rajapakse, Mr. and Mrs. Owen de Run, Mr. J. W. Vanderstraaten, Rev. and Mrs. Corlett, Mr. and Mrs. J. Morton, Dr. Attygale, Mr. Sam W. Soysa, Mr. Francis Perera, Mudaliyar Philip Perera, Mr. Meedeniya, R.M., Mr. L. de Livera and the Misses de Livera, &c., &c.

LIST OF AWARDS.

FLOWERS AND PLANTS.

FLOWERING PLANTS IN POTS.

Judges:—Mr. G M Fowler, Mr. Nock and Mr. Macmillan.

Orchids, Foreign (six)—Hon. Dodwell F Browne.
Asters (six)—Mr. P D Siebel.
Cannas (six)—Miss Lily Vanderstraaten.
Chrysanthemums (three)—Mr. H W Grieve.

CUT FLOWERS IN BOXES, STANDS, OR GLASSES.

Judges :—Mrs Fowler, Miss Grenier, and Mr Nock,
Roses (twelve of diffeient varieties)—Mrs H A Pierls.
Roses (six)—Mr. J R Grieve.
Zinnias (six)—Mr. J R Grieve.
Double Dahlias—Mr. J R Grieve.
Cannas—Mr. H O Beven.
Chrysanthemums—Dr. H Huybertsz.
Carnations—Miss E C Elliott.
Pinks—Mr. P D Siebel.
Pansies—Miss Mary Grieve.
Tube Roses—Dr. H Huybertsz.
Violets—Mr. K Abram Saibo.
Buttonholes—Mrs. R Samaranayeke.
Cross or Wreath—Mrs. Samaranayeke.
Hand Bouquet—Miss Jessie Siebel.
Bridal Bouquet—Mrs. S Siebel.
Flowers in Ice—Messrs. J P Morton & Co
Best decorated Dinner-table—Miss N Drieberg.
General collection of Wild Flowers (2 ft. square) Mr. Jusey Appu.
General collection of Cut Flowers arranged for effect (12 square ft.)—Mr. H M Alwis.
Special Prize for best collection of Pot Plants and Flowers to include the following :—12 assorted Pot Plants, 3 boxes Cut Flowers, 1 Table Bouquet, 1 Hand Bouquet. 3 Buttonholes, gold medal—Mr. P D Siebel.

CUT FLOWERS IN BOXES, STANDS, OR GLASSES.

Best collection of Jambu (twelve of each variety) —Mr. A J R de Soysa, certificate.
Best collection of Namnam—Mr. E A Salgado.
Best collection of Guavas, Uguressa, Lovi-Lovi, Masan, and Nelli (twenty five of each)—Mr. Andris Mendis.
Best Rambutans (one hundred)—Mr. E de Levera.
Best collection of Imported Fruit—Mr. W H Thompson
Fruits in Ice—Messrs. J P Morton & Co., recommended for gold medal.
Special Prize for the best collection of Ceylon-growing Fruit (not less than twelve varieties)—Mr. S Weerackody.

FOLIAGE PLANTS IN POTS.

Judges : Mrs. Broun, Mr. Macmillan, and Mr. Percy Bois.

Begonias (six of different varieties)—Jusey Appu, Colombo Museum.
Anturiums and Allocasias (six of different varieties)—Mr. P D Siebel.
Caladiums (six of different varieties—Mr. R Samaranayeke.
Palms (size of different varieties)—Mrs. Tudor Rajapakse.
Colei (six) — certificate, Jusey Appu, Colombo Museum.
Best specimen of hanging Pot Plant—Mrs. Tudor Rajapakse.
Tastefully arranged Group of Plants for effect (space allowed 100 sq. ft.—Mr. P D Siebel, silver medal.

FERNS IN POTS.

Judges : Mrs. Broun, Mr. Macmillan and Mrs. Percy Bois.

Adiantum Farlyense (two)—Mrs. Tudor Rajapakse.
Best collection of twelve different kinds—Mrs. Tudor Rajapakse.

FRUIT AND VEGETABLES.

FRUITS.

Judges :—Sir Harry Dias, Mr. Broun and Mr Macmillan.

Best Jaffna Mangoes (twelve)—Mr. J R Greve.
Best collection of Mangoes (six of each variety)—Mr. Andris Mendis.
Best Oranges (twelve)—Mr. Adris Mendis.
Best Mandarin Oranges (twelve) — Mr. L S Cabral.
Best Lemons (twelve)—Mrs. E M. Gray.
Best Citrons (six)—Mr. Andris Mendis.
Best Limes (twelve)—Mr. J C Drieberg.
Best Pomelos (six)—Mrs. H A Pieris.
Best Mauritius Pineapples (three)—Mr. H A Pieris, Mudaliyar.
Best West Indian Pineapples (three)—Mr. Andris Mendis.
Best Custard Apples (six)—Mrs. H A Pieris, udaliyar.
Best Mangosteens (twelve) L de Fonseka.
Best bunch of eating Plantains—Mr. J P Salgado.
Best Sapodillas (six)—Mr. Alfred Perera.

VEGETABLES.

JUDGES :—Mr. Nock, Mr. W A de Silva, Mr. P D Siebel.

Best collection of Native Vegetables (twelve distinct kinds)—Mr. K Abram Saibo, Mr. R S Cabaral and Mr. R W Fernando (certificate.)
Best collection of Exotic Vegetables (twelve distinct kinds)—Mrs. W O Garth.
Beans (Exotic, four varieties, 25 of each)—Master G A Garth.
Beans (Native, four varieties, 25 of each)—Mr. M J Fernando.
Yams (six edible varieties. two of each)—Mr. R A Dassanayaka.
Gourds and Pumpkins (six kinds, two of each)— Mr. Andris Mendis.
Best Tomatoes (twelve) Mr. D C Jayawardana.
Lettuces (three cabbage, three cos)—Master Kidston Garth.
Potatoes (dish of nine tubers) Mrs. W O Garth and Mohamed Ibrahim Saibo (certificate.)
Sweet Potatoes (twelve tubers) Mr. H A de Silva.
Chillies—Mr. J R De Soysa.
Cucumbers (best pair)—Mrs. Jeronis Pieris.
Ceylon-grown Onions (5 lb.)—Mr. J W C De Soysa.
Breadfruits (six)—Mr. J P Salgado.
Jak (largest single fruit)—Mr. B W Gunawardena.
Jak (single fruit of best quality)—Mr. J D Perera.
Brinjals (twelve)—Mr. H A Pieris.
Collection of Leaves of Native Plants used as Food. Mr. C D S Jayawardena.
Turnips—Miss M E Garth.
Carrots—Mrs. W O Garth.
Best Beetroots—Mr. K Abraham Saibo.
Celery—Miss Caroline F Garth.
Cauliflowers (three head)—Mr. J M Garth.
Cabbages—Mr D C Jayawardena.
Cabbage (heaviest head)—Mr. D C Jayawardena.
Peas (best dish) Miss C E Garth.
Rhubarb—Master Garth.

VEGETABLE PRODUCTS.

Judges :—Mr. Cochran, Mr. Broun and Mr. S C Obeyesekere.

Coconut Oil (two gallons)—Gold medal, Mr. G C Warr; silver medal, Mr. A P Goonetilleke; certificate, Mr. H L F Dharmaratne.
Kekuna Oil (half gallon)—Mr. G C Warr.
Lemon and Citronella Grass Oils (one bottle of each)—Messrs. Winter & Sons.
Cinnamon Leaf and Bark Oils (one bottle of each) —Mr. H Salgadoe.
Best general collection of oils (two dozen of each) —1st, Mr. W H Fernando; 2nd, Mr. G C Warr, certificate; 3rd, Don G Kapurubanda, special certificate.
Best general collection of Gums and Resins—Mr. D J Samerawira.
Coir Fibre (one pound)—Mr. D A D S Gunaratne
Kitul Fibre (one pound)—Mr. W H Fernando
Palmirah Fibre (one pound) Mr. A J R de Soysa.
Collection of Native Fibres (quarter pound of each) —Mr. J H Meedeniya, R.M., certificate.
Ceylon-made Cigars from Country Tobacco (twenty-five)—Mr. W P Burnard.
Best sample Ceylon Annatto—Mr. A VanStarrex.
Best commercial sample of Rubber (half pound) —Lady de Soysa.

FOOD PRODUCTS.

Judges: Mr. F Waldock, Mr. P Coomaraswamy and Mr. H L Daniel.

Commercial sample of Coconuts (twelve)—

Collection of Coconuts (space one hundred square feet)—Mr. J W C De Soysa.

Arecanuts (twenty-five)—Mr. Julius Perera.

Judges: Mr. Seneviratne and Mr. W A de Silva.

Sample of Paddy (quarter bushel)—Mr. R E De Soysa; Mr. R de Saram, certificate.

Best collection of different varieties of Paddy—Gold medal, Mr. A W D Jayasuriya; Mr. A P Gunatilleke.

Best collection of the following Grains:—Kurakkan, Mineri, Amu, Tanahal, Muneta (one measure of each)—Mr. A P Gunatilleke.

Indian Corn (two measures)—Mr. A J R De Soysa.

Sugarcane (six sticks)—Mr. C E A Dias.

Betel (one hundred leaves)—Mr. H W D Bandaranayaka.

Nutmegs with Aril (two dozen)—Mr. Andris Mendis.

Judges: Mr. Macmillan, Meedeniya Ratemahatmaya and Mr. Francis Beven.

Vanilla (one pound)—Mr. Walter Dias

Pepper (five pounds)—Mr. J W C De Soysa, 1st; Mr. C C Barber, special commendation.

Arrowroot (five pounds)—Mrs. Arnold Dias.

Cardamoms (five pounds)—Mr. James Westland.

Judges: Mr. Cochran, Mr. A W Abrew, Mr. Francis Beven

Cinnamon (twenty-five pounds)—Gold medal, Mr. J W C De Soysa; silver medal, Mr. H W de Silva.

Judge: Mr. George Vanderspar

Cacao (ten pounds)—Gold medal, Mr. C C Barber.

Judges; Mr. Lionel Leefe and Mr. James Forbes.

Liberian Coffee (five pounds)—Mr. A J R De Soysa.

Ceylon Pickles: Cabbage, Cucumber and Mixed (one bottle of each)—Mrs. H L Daniel.

Judges: Mrs. F Beven, Mrs. W G Vandort and Mr. Keppel Browne.

Ceylon Chutnies: Mango, Tamarind and Lime (one bottle of each)—Mr. G C Ponam.

Ceylon Preserves: Mango, Pineapple and Embarella (one bottle of each) Mrs. E M Gray.

Judges: Mr. Keppel Browne, Mrs. W G Vandort and Mrs. F Beven.

Ceylon Crystallized or Candied Fruit (three kinds) Mr. J P Salgado.

Sample Loaf of Bread (one pound)—Mr. H Don Simon.

Rich Ornamented Cake (two pounds)—Miss L Vanderstraaten.

Tray of Native Sweetmeats—Mrs. Arnold Dias.

Tea grown above 1,500 feet (10 lb.); Bargany Estate Deyanikelle Estate highly commended.

Tea grown below 1,500 feet (10 lb.), Salawa Estate, Gold medal: Yahalakela, highly commended.

CATTLE AND POULTRY.

CATTLE.

(Only Animals bred and born in Ceylon can compete.)

Judges: The Mahamudaliyar, Mr. Chinniah and Mr. A Y Daniel.

Best Bull of Indian breed—Mr. E L F De Soysa, gold medal.

Best Cross-bred Native Bull—

Best Cow of Indian breed—

Best Cow (Cross-breed English)—Mr. A J R De Soysa.

Best Buffalo (Bull)

A special certificate was recommended by the Judges for the dwarf bull exhibited by Mr. R E S De Soysa.

Best Bull of Native breed—Mr. J W Chas. De Soysa, gold medal; Mr. A S W D Bandaranyaka, recommended for silver medal.

DAIRY PRODUCE.

Judges:—Mrs. Vigors and Mr. Cochran.

Basket of Fowls' Eggs Mr. C. Andree,

Basket of Ducks' Eggs (one dozen) Mrs. A. R. Amaranayaka.

Basket of Turkey's Eggs—Mr. Chapman Dias.

Special Case of Goose Eggs—Mr. P C J Fernando, certificate.

POULTRY, &c.

Judges:—Mr. E C Davies, Mr. W La Brooy, and Mrs. F L Daniel. Cage of Native or Indian Fowls reared in Ceylon (two pairs), Mr. W H Dassanayaka (game fowls.)

Cage of Fowls of Foreign breed reared in Ceylon (two pair), Mr. C P D Bandaranayaka.

Best cage of Turkeys reared in Ceylon (one pair)—silver medal, Mr. George Thomson.

Best cage of Geese reared in Ceylon (one pair) —Mr. George Thomson.

Best cage of Ducks reared in Ceylon (one pair)—Mr. W Chapman Dias, Mr. George Thompson.

Best cage of six Fowls reared in villages by Sinhalese. Tamils, or Moormen.—Mr. A R Samaranayaka.

Best cage of Pigeons reared in Ceylon (two pairs) —Mr. Edwin de Livera.

Best pen of Poultry in the Show—Mr. T Sanmugam, Gold medal: Mr. Arnold Dias, certificate.

ARTS AND MANUFACTURES.

Judges:—Mrs. J Ferguson, Mrs. S Bandaranayaka, Mrs. H L Daniel, Mr. H W Cave, Mr. H H Cameron and Mr. E Vandort.

Best Native Grass Mats (two)—Mrs. A J R De Soysa, silver medal.

Best single specimen of Ceylon Rattan Work—Messrs Jaldeen & Co.

Best single specimen of Ceylon Wood Carving—Mr. P E Pieris, highly commended.

Best single specimen of Ceylon Ivory Carving—Mr. Kandappa.

For the best specimen of Pillow Lace (six yards, six inches wide)—Mr. Sederahamy.

For the best sample of Embroidery—Mrs. A J R De Soysa.

Judges for Kalutara baskets, models, masks &c:—Mrs. Ferguson, Mrs. S Bandaranayaka, Mrs. A Y Daniel, Mr. H W Cave, Mr. E Vandort, Mr. H H Cameron.

(No entries in the seven classes.)

For the best specimen of Kalutara Basket Work—Mr. J A Weerasooria.

For the best set of Flower Pots (six) Mr. A S W D Bandaranaike.

SUPPLEMENTARY (FOR WHICH NO PRIZE WAS GIVEN.)

Arrack, Mr. Arnold Dias.

Furniture, Messrs. H Don Carolis & Sons, Mr. R de Soysa.

SPECIAL EXHIBITS NOT IN CATALOGUE

Electric Bell, Mr. J L Dharmaratne; Bambara and Beehives, Mr. Alex. B Heral; Madu Plant with Flower and Fruit, and Flour and Cakes made out of it, Mr. C E Samaranayake; Glass Bottle made in Ceylon, Mr. B J Senanares; Collection of Birds' Eggs, Mr. F C Potger, Mr. G Mendis; Kola, undried (five pounds), Mr. J P Williams, Messrs. J A P Williams and Bros.; Plantain Flour, Mr. Chas. Stouter; Ceylon Ointment in Case, Mr. Don Gregoris Kapurubandara. Special contrivance by which Coconut Plants may be protected from being damaged by Cattle, R15. Dr. P M Muttukumaru, Mr. Karl Beven, Mr. Francis L Daniel.

Curious Walking-stick.—Mr. John Abeykone, President, Village Tribunal.

Silver mounted Tea Pot made of a Woodapple.—Mr. John Abeykone, President, Village Tribunal.

Straw Watch Chain.—Mr. E Jayatilleke.

Ceylon Curios.—Mr. O D Vigors.

Coconut Poonac.—Messrs. Stevenson Brothers.

Medical Oil (202 kinds).—Mr. Don Gregoris Kapurubandarasinha.

Hat worn by Colombo Chetties.—Mr. Kandappa.

Antique Boxes, edges bound with Silver carved work.—Mr. Kandappa.

Copper Tittle Deed bearing the Initial of Sri Wickrama Raja Sinha.—Mr. Kandappa.

Complete set of Sinhalese Head dresses in Silver, —Mr. Kandappa.

SPECIAL EXHIBIT FROM COLOMBO MUSEUM.

Butterfly.—Kallima Philarchus, Westwood "This Butterfly, when at rest with closed wings, mimics a dead leaf."

Schizocephalus ?—" A Mantis that imitates grass."

Coffee Leaves Ruined by Tineid Momth (Gracilaria Coffeeifoliell, Nietn).

Polistes Stigma.—(Wasp with nest).

SPECIAL LIST.

1 The best specimens of pillow lace. Podinona, Paris Exhibition prize.

2 Brasswork, name not mentioned first prize, R30.

3 Model electric apparatus for lighting, Mr. D. J. Wimalasurendra, special prize, R30.

4 Set of Masks, Muhandiram, E. J. Gunesekera, first prize; Mudaliyar, Leveris de Fonseka, second prize.

5 Best model arrack distillery, Mr. Arnold Dias, first prize.

THE OPENING CEREMONY.

The Show was open to the general public at 3 p.m., but it was not till 4-30 that the formal opening ceremony by H.E. the Lieut. GOVERNOR, Sir E. N. WALKER, took place when, after presenting the gold medals to the successful competitors, he addressed the gathering. He said:—Ladies and gentlemen, I have great pleasure in responding to the invitation of the Government Agent of the Western Province and the Chairman of the Committee in coming here today, and in having the opportunity of seeing this Show and joining in the distribution of some of the prizes that have been gained. I think that on a comparison of this Show with the one last year we may congratulate ourselves on its success. It is difficult in a large crowd and in a few hurried minutes to make an accurate comparison, but I think that we may comfort ourselves with the assertion that the Show is quite as good as last year, and those who have worked to bring about this Show and the exhibitors are to be congratulated. I am sure it would have given great satisfaction to the Government Agent (the Hon. F. R. Ellis) if he had been present to-day to see the success of that to promote which he has expended such energy. Mr. Ellis seldom puts his hand to anything which does not turn out a success, and when he takes up a thing he generally carries it to a successful issue. I think we may say that he has done so on this occasion. I would, as President of this Society, say that this Society was erected on the Show of last year, and I hope that subscribers will continue, encouraged by the success and pleasure of the meeting to-day, to give it their support and make it one of the established and permanent institutions of the country. As President of this Society I cordially thank all the exhibitors and visitors for the practical manner in which they have contributed to the Exhibition. As an Officer I may say I am only perhaps an official figure-head. I have had nothing whatever to do with the organization of these arrangements, and therefore I have no hesitation in saying that the Committee have been very successful in the Exhibition that we have seen to-day, and in fact I congratulate them upon their labours. I have also to thank Mrs. Fowler, the Government Agent's wife, for having consented to distribute the prizes. (Applause).

Among those present at the opening ceremony were:—H.E. Admiral Bosanquet, the Hon. G M Fowler, Acting Government Agent, Western Province, and Mrs. Fowler, the Hon. L F and Mrs. Lee, Mr. F H Price, Mayor of Colombo; the Hon. W W Mitchell, Sir Harry Dias, and Mr. C Drieberg (Principal of the Agricultural School and Secretary of the Exhibtion); Mr and Mrs. J Ferguson, Mr. C T D Vigors, A.G.A., Kalutara, and Mrs. Vigors, Mr. and Mrs. W L Kindersley, Miss Lucy Ferguson, the Hon. A C Lawrie, Acting Chief Justice; the Hon. Justice Browne Messrs. F W and P Bois, Mr. W E Davidson, A.G.A., Nuwara Eliya; Messrs. W Anderson, G H Alston, J E Alston, Dr. Attygalle, Mr. and Mrs. C Baur, Mrs. Andree, Mr. Advocate Keppel Browne, Mahamudaliyar Don Solomon Dias Bandaranaike and Mrs. Bandaranaike, Mr. H O Beven, Mr. and Mrs. M Cochran, Mrs Clark, Miss Swan, Miss Aitken, Major and Mrs. Carey, Mrs. Campbell, Dr. Cinniah, Mr. and Mrs. E Chapman, Major and Mrs. E C Davies, Mr. Felix Dias, Mr. Owen de Run, Mr. Advocate Dornhorst and Mrs. Dornhorst, Mr. C Brooke Elliott, Dr. and Mrs. Ebell, Mr. and Mrs. J Clovis de Silva, Mr. R Freeman, the Misses Garvin, the Misses Gratiaen, Dr. and Mrs. Garvin, Mr. Advocate C M Fernando, Mrs. Greenhorn, Mrs. Hayward, Mrs. Heinnemann, Miss Joyce, Mr. and Mrs. E H Joseph, Mr. Jacques, Dr. and Mrs. Johnson, Mr. Advocate H Jayewardene, the Hon. C P Layard, Mr and Mrs. J P Morton, Mr. and Mrs. James McIntosh, Mr. R H Morgan, Mr. W Nock, Mr. Advocate Maartensz, Mr. S C Obeyesekere, Miss Obeyesekere, Mrs. Potger, Miss Cora Potger, Mr. Potger, Mr. Advocate J Peries, Mr. A C Rudra, Mrs. and the Misses Rockwood, Mr. and Mrs. R F de Saram, Miss Rene de Saram, Mr. Shelton de Saram, Dr. Allan de Saram, Mr. T Sanmugam, Mr. A Thomson, Mrs. F J de Saram, Miss de Saram, Captain Taylor, Miss Swan, Misses Saunders, Mr. Vanderstraaten, Mr. W P D Vanderstraaten, Mr. H M Waldock, Miss May Walker, Mr. W R Waller (Dikoya), Hon. H L Wendt, &c.

His Excellency who drove up in an open carriage accompanied by Capt. Wyndham, A.D.C., and Capt. Cum Grahame, P.S., and accompanied by mounted orderlies, was received by the Committee under a beautiful pandal at the rear of the buildings, the Volunteer Band, playing the opening bars of the National Anthem. A tour was then made of the exhibition at the close of which the presentation of gold medals was made. At the close of his remarks His Excellency sent for Mr. P D Siebel and personally congratulated him on his magnificent exhibition of flowers, a compliment that was in every way thoroughly deserved.

His Excellency then inspected the cattle, after which he partook of tea in a special marquee erected near the Lecture room, taking his departure at 5-30, the band playing the National Anthem uncovering. We must not omit to mention that Mr. C Drieberg, the energetic and courteous Secretary, was also thanked for his labours.

22nd July, 1899.

The show opened at an early hour this morning and there was soon a sprinkling of visitors, gradually augmented as the morning progressed who were able to leisurely examine the exhibits. Some of these had, especially in the floral department, had lost their freshness and much of their beauty: but care had evidently been exercised by those in charge of the exhibition to do what could be done to preserve the flowers, plants, &c., until the close of the show. Of course a considerable portion of the articles shown are not affected in this way and the exhibits in the art and manufacture classes, as

well as the highly interesting exhibits in the classes devoted to "food products," were examined carefully by the more thoughtful class of visitors.

(*From a Lady Correspondent.*)

This is the first Show of the kind which I have had the pleasure of attending since I came to Ceylon and I must say that it was rather an "eye-opener" to me. I did not, of course, expect to find such a display as I have seen at flower-shows at home and I was surprised to notice the height of perfection to which natives had attained in the culture of the fruits and flowers of the island. Some of the vegetables, particularly carrots and beet-root, were the best I have seen in Colombo, and I thought the display of fruits was exceedingly creditable. The oranges looked very tempting, so did the mangosteens and I don't think that the people of the country could have passed without admiration the display of jaks. A word of praise is due to Messrs. Thompson and Co. for the very fine and neatly laid out show of Australian garden produce, and one cannot wonder that the firm has gained so much popularity in Colombo. While speaking of fruits I must not forget to mention the delightfully cool, refreshing, skilful and artistic work exhibited by Messrs. J P Morton and Co. In the fruit section, there were two nicely moulded pillars of ice in which were frozen an extra large pine-apple and a big bunch of bananas respectively ; and in the flower section there were two similar blocks containing a varied collection of the blooms and leaves that are common in Colombo and of the arecanut flower which, if I may be allowed to say so was the best of Messrs. Morton's exhibits. The display of table decorations seemed to me to be particularly good, but I had expected to find a much better collection of palms and ferns considering the wealth of those in Colombo. Art Work rather took my fancy and I was very envious of the fortunate possessor of the large and magnificently carved side-board which occupied the centre of the room devoted to this section. I had not before seen lace-workers engaged at their occupation and I watched with great interest their deft and industrious fingers turning out the delicate work for which the women of this country are famed. Poultry appeared to me to be a poor show, but I thought the bulls exhibited in the cattle section were a splendid collection. I did not see any that I could praise for speed, but for draught purposes I think those shown would be hard to beat. I had expected to see an imposing spectacle at the opening ceremony, but must confess to having been somewhat disappointed : it was so simple and so brief. Everywhere there was a delightful harmony of colour, not only in the exhibits but in the dressess worn by the ladies, some of them showing exquisite taste and design. I thought we might have had a little more music from the band during the time we were waiting for the arrival of His Excellency. It was a monotonous time, and a sweltering time and anything soothing in addition to Burdayron's ices would have been grateful and comforting.

COFFEE IN NORTHERN INDIA.

More than twenty years ago a well-known Assam planter—the late Mr. C. B. Anderson —visited his brother, Mr. T. C. Anderson, who was at the time resident on Annfield, Dikoya ; and he was so struck with the splendid growth of tea bushes in an avenue leading to the bungalow, that he then and there wanted to start a tea "garden" in Ceylon. Well for him if he had done so! The "avenue" arose from some seed sent from Assam to Mr. T. C. Anderson, which he treated as if it were an ornamental plant, and without the slightest belief in its commercial possibilities in Ceylon. Apart from this want of faith, there was the fact that (although the "leaf-fungus" had already been seven or eight years at work) coffee was at the time "booming"—prices were specially high and no one had the least fear of such young districts as Dimbula, Dikoya and Maskeliya not growing coffee profitably for several decades to come. Accordingly Mr. C. B. Anderson was simply laughed out of his conceit of establishing a tea-garden in Ceylon, some 23 years ago. The Dikoya planters of that time would not hear of it, and, instead, some of them absolutely persuaded Mr. Anderson to take back with him to Assam a select parcel of Ceylon coffee seed and to plant out 100 acres in a favourable situation on behalf of a little Syndicate who joined him in the venture. The coffee grow all right ; but so did the inevitable "leaf-fungus" which by 1880, had changed the entire prospect in Ceylon. Mr. Anderson, we believe, abandoned the Assam clearing before anything like a decent crop had been gathered on it and nothing more was heard of the venture. But very bitterly, we have no doubt, did Mr. T. C. Anderson and some other Dikoya men of the "seventies" regret that they had not allowed Mr. C. B. Anderson, with all his Assam experience, to open out a pioneer tea garden in Ceylon, at a time when prices were so good, and competition so limited in the tea market for the India and Ceylon product.

We are led to recall this true reminiscence of a strange experience in our planting world, by the revival of a cry at this time to plant "coffee" freely in Assam and some other parts of Northern India. We have grave doubts of any appreciable success attending the venture. Fifteen degrees on each side of the equator is usually the limit of coffee growing ; and the coffee bush is by no means so hardy as tea in respect of standing frost, &c. On the other hand, here is the very encouraging report from a planting correspondent of the Indian *Planters' Gazette*, who writes of what he has seen or heard on good authority :—

Any bushes I have seen in Upper Assam or Sylhet seemed to be in perfect health, and bearing crops which it would simply be impossible to beat. I have it on the best authority that Arabian bushes have been growing in South Sylhet in the planters' bungalow compounds for the last ten years or so, and that they have been fruiting all these years. When this is the case there can be no earthly reason why they will not grow and fruit for forty years. I think the real reason that coffee has not been gone in for more is simply that, from the very start, tea has had full sway, and as it has, as a rule, proved a fairly remunerative investment hitherto, there was no special reason for the tea planter to turn his attention to anything else. There can be no doubt that if tea was wiped out of existence in Assam through any cause, that the Assam planters would be equally as capable of rising

to the occasion as the Ceylon planters were when their coffee was all but annihilated by disease. As tea is not now what it used to be—and there can be no hopes whatever that it ever will be in the position it occupied 20 or 30 years ago—I think you do well when you advocate the planting of coffee, or for the matter of that anything, as an auxiliary to tea. Even if the tea districts of Assam could grow sufficient coffee to supply the consumption of the eastern part of India it would always be something, and a very big something, as by all accounts the consumption is large and increasing.

We, in Ceylon, should be very glad, indeed, if planters in any part of Northern India were able to supplement their tea with coffee and to grow the latter profitably. We wish them a full measure of success; but our doubts can only be overcome when we learn of a 100-acre field of Arabian coffee at four to five years old giving a paying crop of the berry without showing signs of exhaustion from the dread leaf disease (*Hemileia vastatrix.*)

INDIAN AND CEYLON ASSOCIATIONS.

TEA IMPORTERS AND THE DRAFT ALLOWANCE:

(Special Report for "Ceylon Observer.")

A meeting of growers and importers of tea was held on Monday, July 3rd, in the Council room of the London Chamber of Commerce, Eastcheap, to receive the report and recommendation of the joint Committee of the Indian Tea Association (London), and the Ceylon Association in London, on the proposed abolition of the 1 lb. draft allowance on tea. There was a crowded attendance, and late-comers had difficulty in finding standing-room. Sir H Seymour King, M.P., K.C.I.E., presided, and there were present :—Messrs. H K Rutherford, J N Stuart, D Cruikshank, Begg, Dunlop & Co. ; H Cholinsley, Chargola Tea Association ; E L Sparks, Messrs. P R Buchanan & Co. ; John M Holt, Messrs. Stewart, Holt & Co.; W Johnson, New Sylhet Company ; Douglas R Smith, G G Anderson, Scottish Ceylon Tea Company ; Geo. Stehn, Messrs. Wilson, Smithett & Co. ; Jas. F Anderson, Messrs. Lyall, Anderson & Co. ; W H Anderson, New Dimbula Company ; R Gordon Shaw, F D Mitchell, Jno. J Edelsten, W J Thompson, Jnr. John McEwan, D M Stewart, W Watson, T C Owen, Messrs. Rowe, White & Co. ; A Thomson, Wm. McKenzie, P Oswald, C C McLeod, R S Corbett, P G Spence, C A Goodricke, R A Cameron, W S Bennett, Jno. Hamilton, J L Anstruther, H Earnshaw, A Bethune, G J Gibson, J M Smith, J L Shand, H J Vollar, R C Dowling, W J Skene, G A Talbot, F Pook, H S J Oscar Thompson, F H Cumberlege, E H Gregory, Alford Want, A Bryans, Messrs. P R Buchanan & Co. ; F W Holt, Geo. W Christison, H A Hancock, A B Tomkins, J H Dickson, Robt. Anderson, Hugh Fraser, A Crabbe, G W Payne, A L Hutchison, W G Smith, Scottish Trust & Loan Company ; Jas. Sinclair, W McDonald, J Hughes, M P Evans, A W Stopford Sackville, G H Austin, R Hart, J Steel, J W Sidey, A E Butler, W S Warren, K Brown, D Wilson, J A Roberts, C E Strachan, R B Magor, Messrs. Geo. Williamson & Co. ; Geo. White, G Seton, S H Smith, Carolina Tea Company ; Alfred Brown, T S Dobree, T A Williams, Blackwood Coffee Company ; Geo. G Playfair, Lebong Company ; H L Tottenham, A Ledington, L H Pieris; Duncan W H Skrine, N W Grieve, R C Lyall, Lumsden, G A Dalby, Henry Bois, Sanderson, Jas. Wilson, Arthur Thompson, Adams, Doake, A Collingwood Small, C Milner, A MacLaughlin, C F Hunt, E G Rock, Doom Dooma Tea Company ; A E Watson, Messrs. Geo. Williamson & Co. : C W Wallace, Messrs. G R Shaw & Co. ; representatives of Messrs. Geo. Dunlop & Co. ; Messrs. Finlay, Campbell & Co. ; Messrs. Lister & Biggs ; Messrs. Blyth, Greene, Jourdain & Co. ; and the Kelani Valley Tea Association ; Messrs. Ernest Tye, Secretary, Indi n Tea Association ; and Wm. Martin Leake, Secretary, Ceylon Association in London ; and many others.

SIR SEYMOUR KING'S SPEECH.

The Secretary of the Indian Association (Mr. Ernest Tye) having read the notice convening the meeting,

The CHAIRMAN said :—Gentlemen, the numbers in which you have attended today show that this meeting is one of a historic character in the tea trade. It is one, which must for good or ill influence the course of the history of that trade for a long time to come. We meet here to receive and to deliberate on the report of the Committee of the two influential Associations representing the Indian and Ceylon trade. I owe the accident of having the honour of presiding over your deliberations today, gentlemen, to the fact of my being the honorary president of the Indian Tea Association, and I trust you will forgive me if I do not in every way meet your expectations while I am in a position that might have been filled by others who are more competent to represent the interests of which we have to speak this afternoon. I said this is a historic occasion. We are met to consider the abolition of an ancient custom. There is no doubt as to the antiquity of that custom; there can, equally, be no doubt in the minds of tea growers as to the unreasonableness of the custom (Applause). I have never yet heard, gentlemen, of any custom which long maintained its sanction which necessitated a person giving away, for nothing, a part of what he produced (hear, hear). We are met to consider the question of the one lb. draft on each chest or half-chest of tea which it has been the custom to exact from the growers. If the growers had remained prosperous, perhaps, the question would not have been raised. But there is no one in this room who does not know how real is the necessity for pinching economies in the tea industry, and for casting about for some means of making a "living wage" out of it. The growers and importers have therefore had to consider whether they cannot save a considerable sum every year by the abolition of the 1 lb. draft. (Hear, hear.) They would, I feel sure, welcome some change in the present method of weighing the tea, but that seemed impracticable. The method of weighing already imposes a heavy toll on the producer, who feels that that toll is sufficient without the addition of the 1 lb. draft allowance, (hear, hear.) At the same time we have to remember that those who purchase from us are worthy of every consideration and cultivation on our part. One cannot well exist without the other. Perhaps the producer is more necessary to the retailer than the retailer is to the producer, because, after all, the retailer does not buy our tea because he loves us, but because he must have tea to sell to those who want to drink it. (Hear, hear.) But at the same time it must be obvious to everyone that friendliness, courtesy and

pleasant relations between both parties are essential for the smooth and profitable conduct of the industry—(hear, hear)—and I venture to think your joint Committee—as you will hear when the report is submitted to you—has done all it could do to promote good feeling and harmony. Both sides must recognise that it is a question that appeals to the pockets of both, and that, therefore, it is necessarily a disputable question, and one that will be fought out. But there is no reason why it should not be fought in a pleasant spirit. The retailer must recognise the position into which the industry has drifted. We wish the retailer a prosperous time. But there is nothing to be gained by threats to boycott tea sales and to cease dealing with those who produce what the retailer must have. (Applause.) Has there ever been in the history of the tea industry such unanimity as has been displayed on this occasion? I venture to say, never. (Hear, hear.) There have been in the past many questions that have moved the trade deeply, and to deal with which special committees have been appointed. But on no subject has there ever been such an approximation to absolute unanimity as on this particular question. Now, I think that must impress the retailers and the public at large. (Hear, hear.) Nothing, I venture to say, but dire necessity, the compelling necessity of the *res angusta*, could have possibly driven the producers of tea into line like this. I think that the amount of Indian and Ceylon tea imported into London last year was about 227,000,000 lb., and those responsible for 215,000,000 lb. of that total have already signified their assent to the present movement, and fresh assents are still coming in. So that practically the Indian and Ceylon tea-growing industry is unanimous. Then we have to see what the other side have got to say. Their argument seems to be, "We have always received this little tip for buying your teas, and therefore it must remain a factor in all our dealings." Time will show which side to prevail. I have now only to thank you for the kindness with which you have listened to these few remarks of mine, and to ask you to listen carefully to those who will follow, and then to signify your opinion as to the course that should be pursued. (Applause.)

MR RUTHERFORD'S VIEWS.

Mr. H. K. Rutherford:—As chairman of the joint committee of the Indian and Ceylon Associations appointed to consider this matter it falls to me to present to you the committee's report, which is already in your hands, and to announce to you the recommendation of that committee. But I daresay, there are some few here who will ask, "What is the use of such a meeting seeing that you have all signified your assent to the proposal?" Well, in its deliberations the committee realized that the more this question was studied the greater appeared the injustice to the importer (hear, hear); and we also wish the importers who are present today to thoroughly understand the matter. We want as much light thrown upon the subject as possible, not only on behalf of yourselves, gentlemen, but of the dealers, the Government and the public. (Hear, hear.) All of these parties are concerned and interested in the weighment of tea. This question of the abolition of the draft cannot be taken apart from the system of weighing-out tea. We must insist upon that. (Applause.) At the mass meeting of dealers and retailers held on June 7th reference to the system of weighment of tea by the Customs was studiously avoided. Now, we held that the two questions are inseparably connected. (Hear, hear.) It is well that we should all know something about the history of weighing-out tea by the Customs. In October, 1885, a joint signed written agreement was entered into by the Indian Tea Association of London and the Wholesale Dealers' Association—there was no Ceylon Association in those days—that all teas should be weighed net. That, gentlemen, I take it, was an honest attempt to get at an accurate and true system of weighing-out teas. That agreement was in force for 3½ years or so, and then the Wholesale Dealers gave notice that the trade would in future, from June, 1889, refuse to buy any more teas weighed on that system. A joint Committee of the Indian and Ceylon Associations and the Wholesale Dealers' Association was then appointed to consider the subject and if possible to come to some mutual understanding. While that Committee was at work the Wholesale Dealers' Association approached the trade, and then intimated to the Indian and Ceylon Associations that it was useless further discussing the subject as the trade had come to a unanimous conclusion that they would absolutely refuse to buy any teas that were weighed net, and that all tea must in future be weighed gross and tare—a system that on an average gives them 1 lb. more in every package than they pay for, in addition the 1 lb. allowed for draft. You will see by this that it was the Wholesale Dealers who broke away from the joint signed agreement, and the system which they thus arbitrarily brought into force continues at the present time. In October, 1890, Her Majesty's Customs, finding they were losing by this system a certain amount of duty, ordered that in future all teas must be weighed and charged for duty to the halfpound. (Hear, hear.) That was the second attempt to get at a just system of weighing, and it had the support of the Indian and Ceylon Associations. But the trade resolutely opposed the proposal of the Government, and the Government were weak enough—I suppose in view of a general election being near at hand (laughter)—to withdraw or to suspend the operation of their own order, and it has been suspended since that time. Well, you will see from these facts that it has been impossible to get the dealers to accede to any reasonable proposals for the proper weighment of our tea. (Hear, hear). That brings us up to the origin of the present movement. From time to time the Indian and Ceylon Asssociations have been approached by the various representative bodies in India and Ceylon, and also by individual growers and importers in this country, asking if nothing could be done to mitigate the great loss in weight the teas suffered when put up for sale in London. Well, after the attempts made by the Associations to get something done they did not see what further they could do in the matter. However, owing I presume to the lessened profits from tea cultivation, owing to the various causes of exchange and low prices, the planters recently approached the Asssociations more strenuously than ever, and their demands became more accentuated. In March last, the two Associations conferred together to see what was best to be done in the circumstances, and they came to the conclusion that it would be hopeless without the good offices of the Government to try again to get anything done to bring about the proper weighing of the teas. And they came to the conclusion that to meet the case they must approach the

dealers in order to have the draft allowance on teas abolished. (Applause.) It was obvious, of course, that no great change such as this could be effected without the entire support of the importing community, and as you have seen by the circular that the Committee has issued that the support is practically unanimous. (Hear, hear). I may also add that the Planters' Association in Kandy have passed a resolution entirely approving of this movement, and last which we received a telegram from the Chamber of Commeree in Colombo, informing us that they gave the movement their entire support. (Applause.) Well, gentlemen, such an overwhelming acquiescence in our proposal is a convincing proof, if any further proof were wanted, of the injustice of this 1 lb. draft allowance in addition to the allowance already made in the weighing-up of our teas. (Hear, hear). I need not tell you anything further about the movement as the account of it is set forth in the Committee's circular to you. That, therefore, brings the whole thing up to date. With your permission, however, I would like to make some remarks as to the arguments of the dealers in opposing this proposal. The reasons they give for their opposition to the abolition of the draft are two: one is that the draft allowance is an ancient custom; the second is that the allowance is necessary, in order to pay for the loss they sustain in leakage of packages, by bad bulking, and by the presence in the packages of nails and lead as well as the loss of weight incurred in the process of packing the tea in small quantities for the retail market. We admit it is an ancient custom, coming as it does from an ancient people. In China tea is subjected to squeezes all through, and the last squeeze was made by Englishmen—though what they took from the Chinaman in this last case they had to give back when the tea got here. (Hear, hear.) But in London the dealers have to deal, practically altogether, direct with the growers of Indian and Ceylon tea. At least 90 per cent of tea in London is in the hands of the producers, and I think we are made of sterner stuff than to submit to be squeezed as the Chinaman does. (Applause). In recent years India and Ceylon have developed markets for their teas in Australia, Canada, and other colonies in Amerca, and in Russia and other parts of the continent of Europe. In none of these countries are we subject to this 1 lb. draft. It seems a most extraordinary thing that only in this free country of England are we countervailed to this extent. (Hear, hear.) We are on the same line as our brother planters in sugar; we want to trade on right terms with all countries alike. (Hear, hear.) As to the re-weighment of tea in small quantities, we were all staggered the other day by the evidence given by some large tea-dealers, who said it was an ancient (not an honourable) and universal custom for tea to be sold short weight to the public. (Laughter and hear, hear.) Well, gentlemen, is it high time that this "ancient trade custom" was swept away. (Hear, hear; and a voice: "But it isn't a custom.") We were told in the police court that it was a custom. Growers have always thought it a mystery how the dealers were able to sell so cheaply to the public. (Hear, hear.) But the recent proceedings have unmasked the mystery. (Hear, hear.) If any of you growers calculate the value of tea given away in draft, the value given away in extra weight by the Customs' system of weighing, and the loss the Government suffer in the amount of duty not paid on the extra weight, but which the retailer adds to the value of his tea when he sells it, and if you assume that only 50 per cent of the retailers sell short weight to the public, you will find the value amounts to no less than £380,000 per annum! Whether the abolition of the draft is carried through or not, or whether it is equalised by an arrangement of price, still I think that all this indefensible system of carrying on the tea trade of the country ought to be done away with, and the trade put on a more euquitable footing all round. (Applause.) The other argument is that the draft goes to cover defects and the presence of foreign substances in the packages. That is the weakest argument of all, because the incidence of the penalty falls on the importer whose work is in good order, more heavily than on the man whose work is defective. (Hear, hear.) If the 1 lb. draft were removed the importer who does his work badly could be made to suffer; while it remains the same defects will remain. This draft allowance is a premium on bad work, and a penalty on those who do their work well. (Hear, hear.) I therefore propose for your consideration the recommendation of the Committee, which is:—"That it is the unanimous recommendation of the joint Committee of the Indian and Ceylon Associations appointed to deal with the question of the 1 lb. draft abolition on tea, that notice be immediately given to the Tea Brokers' and Wholesale Dealers' Association that on and after the 17th inst., all teas shall be sold on the condition that the 1 lb. draft allowance shall not be made to the buyers." (Loud applause.) I trust, gentlemen, this recommendation will meet with your entire and unanimous approval and support, and that we will be able to show the trade that the great tea-planting interest of Indian and Ceylon have at length awakened to the fact that they must have a voice, that they insist on having a voice, in determining how their produce shall be offered for sale. (Loud applause.)

THE FIRST RESOLUTION.

Mr. C W WALLACE (Messrs. R G Shaw & Co.) moved the following resolution:—"That this meeting adopts the unanimous recommendation of the Committee, that on and after the 17th inst. all teas shall be sold on the condition that the 1lb draft allowance shall not be made to the buyers." (Applause.) The speaker said he agreed with the Chairman when he alluded recently to the applicability of the phrase of Rudyard Kipling about "The men who bear the white man's burden in a foreign land" to the tea-growers in Assam and Ceylon. I hope to steer clear (the speaker proceeded) of anything that sounds either bellicose or hostile to any section of the trade in London. For, sir, I hold that it is necessary for every section of every community to treat every other section with forbearance and good will. But there *will* arise occasions in every community when from some reason or other it is found that one section is appropriating too many of the loaves and fishes which belong to the whole. (Hear, hear.) This may arise in various ways—some fair, some unfair. Those of which I speak today are perfectly fair, but they are none the less hard. In most cases this sort of thing comes about owing to the survival of an "ancient custom," or because changes necessary to the evolution of society have at last made a former practice intolerable. A statement which has been made is that we lose 1lb in the weighing,

The tea itself is not weighed at all. The package is weighed gross, no fraction of a pound avoirdupois being used, and the turn of the scale being always given *against* the package. If the gross weight of a chest of tea is 130,001lb or anything from that up to 130.999lb it is entered as 130lbs only. Then the tea is turned out and put aside, and the box, the lead, etc., are put together on the scale. Again, no fractional weights are used, but instead of the turn of the scale being now given against the buyer, to counterbalance the effect of the turn on the gross weighing, it is still given against the package. It is like hitting a man on the nose and then hitting him on the back of the head to make up for it (Laughter). If the tare is 30,001 lb it is reckoned as 31 lb. So that by neither of the processes does the grower gain anything; he must on an average lose half-a-pound on each weighing, which means a loss of 1lb on each package of tea. Next he loses 1 lb on the draft. Both these imposts we have borne patiently, with just an occasional grumble, the reason being that up to a few years ago there was shown a fair profit, enabling us to bear a burden, that did not rightly belong to us. But still it was a burden and it was not a just one in either case. I know it is said that some producing companies still manage to pay a large dividend. But, gentlemen, I would point out to the buyers and to you that these dividends which sound very large by percentages are, owing to a curious custom in the tea industry are, not reckoned upon the cost of the gardens, machinery, etc., but upon the capital. The capital is not watered, and the custom in the industry is to re-invest the profits in increasing the profits, in increasing the output, and so on. If you take the dividends and divide them over the gardens, with what they have cost in buildings, machinery, etc., they would work out at something nearer 3 and 4 per cent than the 12 to 15 per cent that has been spoken of. There are a great number of gardens which cannot make both ends meet, far less earn dividends of 12 and 15 per cent (hear, hear.) The facts are there, and can be ascertained by reference to the newspapers of London and Calcutta and Colombo. We are accused of trying to take the buyers' profits and perquisites. That is not so. Long before this movement was started the growers of India and Ceylon set themselves the task of reducing expenditure in every possible item and that not only in Assam and Ceylon, but in London, as far as their own people were concerned (hear, hear). Commissions have been reduced all round, and every other kind of expense has been reduced (hear, hear). In London I know of many directors of tea concerns returning their fees in the hope of better times, if better times should ever come. Establishments on the other side have been reduced, and in the last cold weather over 200 planters were in Calcutta seeking work without avail. With all this before us, can it be truly said that as soon as our profits are reduced we seek to take the profits and perquisites of the buyers? No, we made all the reductions we possibly could in our own countries of production first, and now we find it necessary to come to London to see if we cannot reduce charges and imports which are far too heavy (hear, hear). Foremost among these imposts are the present system of weighing and the 1 lb. draft. You might say it doesn't matter which of the two we amend. But if we amended the system of weighing, either we should have to incur an extra charge for weighing, or we should have to get the Government to amend its weighing system, and if the latter then the Government tax upon this article of necessity would be increased. Whether you be all Liberals—and I hope you all are (laughter and "No")—well, some of you may be Conservatives (laughter)—but whatever you are I am quite sure none of you love our Government to the extent of wishing to increase the duty which, by an "ancient custom," is levied upon this necessary of life as if it were a luxury like wine or spirits, or tobacco (laughter.) I therefore come to the 1 lb. draft. Let the buyers leave us that and be satisfied with the 1 lb. extra per package that they already get in the weighing (hear, hear.) That has been felt to be the right course by all the growers and their representatives, and such is the resolution I have just read out to you. There are one or two misconceptions that I should very much like to remove, for the benefit of those outside. There are two misconceptions, and we have throughout had two charges brought against us. The first is a want of courtesy to the buyers, and the want of good faith. As to want of courtesy, I am sure, I carry you all with me when I say that nothing would distress me more than to deserve such an imputation. What are the facts of the case? The Chairman of the Committee has given you the history of this 1 lb. draft movement, and I would only add that the Committee was appointed not with the case prejudged, but appointed to look into the matter and report to us. They have reported to us today, but what have they done in the meantime? They met the buyers and consulted them, hearing all they had got to say; they did not even draft their report till they had heard the buyers' side of the question. It is now for us to say what we will do. The Committees of both Associations have been called bad names and neither of them has even gone so far as to say "You're another" (laughter). The charge of discourtesy is certainly not proved. There are two parties to every agreement or contract, and for one party to alter the terms without the previous consent of the other party is certainly evidence of a want of good faith. That is a truism to which I assent. But there is this fallacy in our case—there is no contract at all (hear, hear.) In our case there is no contract till the fall of the auctioneer's hammer. The Committee proposes that we should do as we please with teas which are at the present moment our absolute property, to do what we like with. If we like we may ship them to America; we may burn them if we like; we may drink them (laughter). None of these courses could lay us open to a charge of bad faith. And how can the carrying out of our present proposal lay us open to the charge? Our teas have an intrinsic vlaue, and if we offer them at public auction, offer them to the world at large, and one man won't buy them—well, other men will (applause). Not the most timid grower need be afraid because one set of buyers abstains from attending one sale (laughter and hear, hear). If these buyers who have made their fortunes out of our teas abstain from buying any more—(laughter)—another set of buyers, of other new companies, will come forward to buy them (hear, hear). I hope the buyers will try to look at the matter from the growers' point of view as well as from their own. (Applause.)

THE SECONDER'S SPEECH.

Mr. Arthur Bryans (Messrs. P R Buchanan & Co.):—I rise to second the resolution. As a member of the Committee I should like to say that

it is only dire necessity that has brought us, to this pass. (Hear, hear). We had to consider the two points to which reference has been made in order to see what we could do to meet the bad times. There has never been such a year for tea-growers as the past year, and the question of the sale of our teas naturally came under consideration—the two points that came before us being, of course, the system of weighment and the 1 lb. draft. Our duty was to consult you. We asked you what your opinion was, and we received from you what I consider practically a unanimous mandate to go on with the movement for the abolition of the draft allowance (applause.) It was so unanimous that it seemed we could do nothing but move the resolution we have brought to your notice today, unless there was some strong reason against it. Unless this strong reason could be adduced, we as a committee, it seems to me, had no alternative but to proceed. The only way to get reasons against our proposal was to meet the trade. But there was considerable delay. The trade held a mass meeting, and they threw over the Wholesale Tea Dealers' Association and at last appointed a committee representing the retailers and the buyers to meet us. I had great hopes of that meeting, and was woefully disappointed. What was the answer we got? It was simply an answer of *non possumus*: the only plea the trade put forward was "We can't and won't meet you.' Some one suggested the possibility of a compromise: they would not listen to such a thing. Under those circumstances I do not see what we could do other than we have done. (Hear, hear.) I am one of those people who consider that we have a right to sell our goods on our own terms (applause), prvoided those terms are fairly just, and I cannot conceive that making a present of 1 lb. of tea in every chest and half-chest is just, or that to abolish the custom can be called an injustice. (Hear, hear.) One thing that took place at our meeting with the trade took my breath away; I think it took away the breath of the whole committee. The trade said, "We don't get and extra weight at all." (Laughter.) They told us, "You are the sinners, and we are the sinned—against." One importer produced a most elaborate weighment return of a very large number of chests, done to the ounce in his own presence, to show that his loss was 1¾ per cent for the whole lot. It was handed to them, and they returned it and pooh-poohed it, and implied that they did not believe a word of what he said. We are not all dreaming: it *can't* be possible that we don't lose any tea on these transactions. (Laughter). In calculating our averages for many thousands of chests I have always to make an allowance of two per cent to cover loss of tea that we are not paid for. (Hear, hear.) I have found in the course of many years' experience that less than two per cent will not cover it. The trade representatives said, "Oh, but you can't weigh your tea properly." But they know it is not we who weigh the teas, but Her Majesty's Customs. I don't like the system, because it tells against me; but it is not likely that Her Majesty's Customs would cheat themselves. I hold in my hand a letter from the manager of one of the warehouses, in which he says that "the weighment of tea and the 1 lb. draft given from two to two-and-half lb. per chest is against the importer, and the Customs also lose ...e in duty on each chest." I don't think ...a have any stronger evidence that the trade ...t more than they pay for. Let me draw attention to the extraordinary notice issued on Friday last, the like of which I have never seen in the City of London. (Applause.) It is issued without signature, and it proposes to condemn, by not buying at the auctions this morning, a resolution to be submitted for approval this afternoon. (Laughter). Surely this can be only one thing—a threat; it can be nothing else. I have ceased to be surprised at the actions of the body that is manœuvring the opposition to our proposal. There has been made the unwarrantable assertion that there was an understanding that the abolition on draft would not be forced upon the trade against their wishes. I know the whole of the negociations, and the committee will bear me out when I say there never was such an understanding, and I hope there never will be. Hear, hear). I revert to my original proposition: we have the right to offer our goods for sale on our own conditions. Some of the conditions of sale want revising. In two cases I admit they tell hardly against the trade. One clause is very badly drawn, and the sooner it is altered the better. Seeing the lower value obtained for tea, it would, I think, be much fairer that the deposit, instead of being a fixed deposit of £1, should be an *ad valorem* deposit, with a maximum of £1. That is a change that we should insist upon at once. I go further. I say that three days is not sufficient for the trade to inspect their purchases. I would be inclined myself to allow a period of five or six days. (Hear, hear). We do not want to sell them something that is not tea. If they are correct in their statement that extraneous matters are found in the chests, let us, as Mr. Rutherford said, get at the real offenders. We want to sell nothing but pure tea. But we insist upon being paid for every pound of it. (Aapplause.) As to the loss in distribution—in the reweighing in small packages—it is not a fair argument. We importers also have a lot of loss in our own factories. But it cannot concern us what loss there is on our teas after they have ceased to be ours. It is said that there are large profits in the tea trade. But it is not the growers who are making the large profits. (Hear, hear). Turn to the reports published today, last week and the week before, of the large heavily-capitalised concerns of retailers, and you will see who are the people who are making the money. But we, growers and importers, have never been in such straits. The fatal error of the "shilling canister" throughout the country is shelling ruin for us. (Hear, hear.) It is not we who regulate the price for tea; it is the trade. As long as this underselling of tea continues it will redound to our loss. Let us be unanimous today. Let the dissentients from this proposal be only those who have other interests to conserve—the interests of retailing. But let the growers and importers be unanimous. (Hear, hear). Let us continue our present unanimity, and then the abuse will be corrected and this unjust tax abolished. (Applause.)

MR. JOHN MCEWAN:—You said, Mr. Chairman, that 215,000,000 lb. of tea out of 227,000,000 was on the side of this proposal. I believe, I represent 8,000,000 lb. of the deficiency. There are some points in this movement that have not been adduced today. I admit that we, as growers and importers, apparently lose 1¼ per cent on our turnover, taking into account the half-chests, on which we proportionately lose more. But I am not prepared to forego a loss of 1¼ per cent at an expense of 2½ per cent. If you adopt this resolution I think

that the dealers with the new conditions coming into effect will lower their bids ("Oh, no.") It is impossible for a dealer with a loss of the 1 lb. draft to bid at the same rate as one who had before got the allowance. I refuse to agree to this proposal for the abolition of the draft. In the price the buyer pays the draft allowance is allowed for. I do not like the system, but the point in favour of the alteration is really the need for more simplicity in our books. Had the buyers been approached differently and the matter put to them differently, in all probability they would have agreed to the change. I think we could have approached them saying we wanted to do away with the draft in order to get more simplicity in our books, and we could have said that we expected to receive lower bids on account of the abolition. (A laughter.)

The motion was carried with only one dissentient.

The proceedings ended in a vote of thanks to Sir H. Seymour King for presiding, Mr. Stopford Sackville, who proposed it, remarking amid laughter that the buyers at their mass meeting had produced a Lord Mayor, but that the growers had gone one better, for they had played the King.

THE GEOLOGICAL SURVEY.

It is, as we supposed: the services of Mr. Oldham have neither been lent by the Indian Government nor is he under an engagement to stay in Ceylon at this time. Mr. Oldham is on furlough, and, having been in correspondence with His Excellency Sir West Ridgeway as to a Ceylon Survey, he has utilised part of his holidays to visit Ceylon in order to get an idea of what is expected by the Ceylon Government, to have a look at the country and, perhaps, to give his opinion as to how a Survey should be carried out. In the first place, it is no secret that Mr. Oldham is of opinion that, in Ceylon, a Geological should be combined with an Agronomic Survey—as has been done in some parts of India with markedly useful results. This brings the work into close connection with the future Agricultural Department or Board, if such should be the outcome of the Agricultural Commission. It should be remembered that Agriculture often benefits even more than Mining by a Geological Survey, not simply from what may be said (agronomically) of soils; but in the discovery of phosphatic rocks or deposits. Besides plumbago, Mr. Oldham is interested in the mica of Ceylon, and he tells us there is one kind exported from this island—probably that found in Uva, below Haldummulla?—which is very rare in India and is much prized; while the more ordinary kind (probably found in our Western districts?) is commonly associated with phosphates which are of speical value in agriculture. Will any of our readers acquainted with mica deposits or workings in the island, kindly inform us of the same, so that Mr. Oldham may be able to judge whether he can visit the place or places during his present stay in Ceylon?

THE AGRI-HORTICULTURAL SHOW.

So much has been written by way of description in our columns that we have only left the pleasant duty of congratulating the Committee—and especially the Working Committee—on the great success attained with the present Exhibition. Whatever minor defects may be pointed to by critics, no one can deny that the Show as a whole gratified the very large gathering of visitors and admirably answered the end of bringing together, for purposes of comparison, useful products and works of art as well as specimens of live-stock. If we may trespass on the rôle of our reporters, we would remark especially on the floral display, which was very delightful; while regretting with Mr. Nock (who was as usual enthusiastic in his work of arranging and judging) the inadequate show of ferns. For Colombo this was certainly inadequate. In one or two other sections there was room for improvement and we may agree with one gentleman that a little more advertising immediately before the Show would be good. Say for a month previous that a single prominent line about the coming Exhibition appeared in the daily press. But really the wonder is that the indefatigable Honorary Secretary, Mr. Drieberg survives his many and prolonged labours. It is questionable, in fact, whether Government does not want to kill off this most useful officer; for even now, what with Exhibition and Commissions, Mr. Drieberg will be as three single gentlemen rolled into one, even after he has got his hands clear of the present Agri-Horticultural display. May he survive them all and get the substantial reward he will have so fully earned, apart from the comforting assurance that his work is one directly and decidedly for the public good. We trust further that the COLOMBO AGRI-HORTICULTURAL EXHIBITION may be considered to be established on a firm basis as an annually recurring event, whose influence for good is bound to widen and increase with each succeeding year.

THE INSECT ON YOUNG TEA IN THE MORAWAK KORALE.

A LOCAL EXPERIENCE—NOT LIKELY TO SPREAD.

The attack on young tea in a corner in Morawak Korale must be quite a local matter, of no special importance as regards the industry generally even in the district referred to. We must, however, confess that we have not yet identified the insect concerned and that from the account given to us lately by the Visiting Agent, it is a novel as well as mischievous and very disagreeable visitor. It cannot be called a beetle, for its motion is crawling after the fashion of the lowest form of life. It is discovered crawling up the tea bush in all sizes from a green speck up to a creature half-an-inch long by one-fourth at widest, nearly oval, green like the tea-leaf save for one or two reddish or orange specks; but the striking peculiarity is in small bristles on the back and sides which when touched give a decided electric shock. This, of course, prevents the coolies from touching them with their hands and the process of gathering is therefore a slow one. There is no sign of the surrounding jungle being affected by them; but they do not despise

cinchona leaves, while the tea leaf they devour, from the toughest to the tenderest. Still, an insect of this kind attaining an appreciable size can be dealt with as a local matter; a deep trench may perhaps prevent its crossing from one field to another, as its locomotion is so slow and altogether it is a very different matter from a fungus pest blown about by the wind, or even from helopeltis which spread and multiply so quickly and resist wind. Still such insects as the present one can do much harm while their day lasts—ten acres of tea stripped to the bare stems and branches (no wood is touched) is no joke; but in Darjiling we read in one year of a 100 acres of young tea being destroyed as soon as planted by a sudden outburst of a white grub beetle. We can see nothing in Cotes' "Tea Insects of India" to answer to the Morawak Korale visitor. We are inclined to think it must be of the weevil family, and here is what Nietner says of one of the kind which had consumed every leaf of coffee on fields in Maturata:—

Arhines (?) destructor.

This is a beautiful green weevil, $2\frac{1}{2}'''$ long and 1'' broad, oval, narrowed in front, covered all over with closely set but isolated gold-green scales, winged. The head is rather short and blunt; antennæ apical, elbowed at the middle, the part beyond the middle being composed of eleven joints, forming a club towards the end, the third joint from the tip being the thickest: they are brown, hairy beyond the middle; the thorax is plump, subconical; the anterior legs are the longest, the second pair the shortest, the tibæ and tarsi of all are hairy, the tarsi with hairy brushes underneath, especially thick at the third joint which is deeply 2-lobed; the tibiæ of the second pair are long, serrated inside, curved and 2-hooked at the apex. The insect varies considerably in size and colour.

This pretty beetle is common during the dry weather, but I have never found it do any injury to the coffee. Mr. James Rose, of Maturata, who first directed my attention to it, wrote to me:—"The mischief they do to the coffee is really frightful, and if they were as plentiful as the bug, they would be our worst enemies. Five or six acres were completely covered with them, and they consumed almost every leaf. Year after year they appeared upon the same place. This year they appeared upon a neighbouring estate in great force, and ran over at least forty acres. The same thing occurred on three other estates." Mr. Rose conveys a pretty picture to the mind of the entomologist by stating, that in May, when these insects disappear, the logs and rocks may be seen strewed with their bright green elytra.

The family of the weevils is one of the most extensive amongst the beetles, and many of its members both here and in Europe do much injury to agricultural produce. I have seen nearly the whole sweet potato (*Batatas edulis*) crop of the Negombo district destroyed by one of them, the *Cylas turcipennis*. The common rice-weevil, *Sitophilus oryzae*, is another instance, and one of the coconut destroyers of the low-country belongs also to this family, the *Sphoenophorsus planipennis*.

We now await further specimens from the Morawak Korale to send to Mr. Haly of the Museum to examine under the microscope.

TEA-DRINKING IN RUSSIA.

(Special for "Ceylon Observer.")

"With regard to Russian tea and tea-drinking," a young engineer and surveyor, who was recently Assistant Engineer to a large Railway Survey party in Eastern Russia, writes to us by this mail:—"The tea comes from China principally and is brought overland. I suppose the [Siberian] Railway will carry it soon. A Russian offers you tea immediately you go to see him, whatever hour of the day or night it may be. The *samovar*—a big brass kettle soup-tureen arrangement—is brought in, full of boiling water which is kept at boiling point by red-hot charcoal in a hollow inside. The tea is made in a small China tea-pot—about one to two inches deep of tea is poured into a glass tumbler and the rest is filled up with water from the *samovar*; a slice or two of lemon put in, and a couple of lumps of sugar thrown in, completes it. It is very weak, of course, with so much water; but they swill so much of it that if it was strong they could not stand it. It is more straw coloured than English tea. It wants some practice to hold the glass, because it is jolly hot; the spoon always stops in the glass and the first finger of the hand holding the glass holds the spoon against the side opposite one's mouth when drinking. I understand that the Ladies of the higher aristocracy now drink it out of cups and with milk. Not being acquainted with any L's of the H.A., I have not seen this."

[Our correspondent's last letter appeared in our issue of January 24th, and his account of further experiences of railway surveying in Asia Minor will be given in another issue.—Ed. *T.A.*]

West India Fruits.—The report of the Commission which was sent to the West Indian Islands to inquire into the causes of the bankrupt condition of the various industries in the colony was published in these columns at the time of its issue, and it was felt that the Government would be justified in holding out a helping hand in order that a fresh start in life might be given to people who had suffered long and struggled manfully against adverse fortune. There had been too much of the one-basket system; our Government is about to help to inaugurate a new state of things, and we may here briefly epitomise what it is the Colonial Department has made up its mind to do. A contract has been signed by Mr. Chamberlain with the Jamaica Fruit and Produce Association for direct fruit and passenger service between this country and Jamaica, and there are now four steamers being built on the Clyde and the East Coast to run between Southampton and Jamaica, the running to begin in May of next year. This contract will last for five years, and the ships will run fortnightly. The steamers will be fitted for fruit carriage, and will have storage sufficient for at least 20,000 bunches of bananas; a few passengers will also be carried. The subsidy proposed to be paid is £10,000 per annum, of which the Government will contribute half, to be increased to £12,000 if more passenger accommodation is required. Of course fruit other than bananas may be carried, but taste seems to have set that way, and we are asked to believe that 3 lb weight of baked bananas are quite equal to seven times that weight of wheaten bread. It is further stated that banana flour may be profitably utilised for the nursery as well as the adult *cuisine*; but the flour could, of course, be most profitably manufactured where the fruit is produced, as sugar where the cane is ripened.—*Gardeners' Chronicle*, July 15.

TO ALL PARTS OF ASIA, AFRICA, AMERICA AND OCEANIA.

Seeds & Plants of Commercial Products.

Hevea Brasiliensis (Para Rubber).—Orders being booked for the coming crop available in August and September. This is the only crop of seeds in the year. All orders should reach us before the end of July to avoid disappointment, as we have to make arrangements in time; guaranteed to arrive in good order at destination. We have already booked a large number of orders. A Sumatra Planter writes, dating 9th March, 1899 :—"I consent to the price of £——per thousand. I herewith order 50,000 upon condition that you guarantee at least 33 % seeds germinating." Plants can be forwarded all the year round in Wardian cases. Price and particulars as per our Circular No. 30.

Ficus Elastica (Assam and Java Rubber.)—Seeds supplied by the pound with instructions; price according to quantity. This tree grows equally well in high and low land, in forest and grass land, its cultivation being extended largely by the Indian Government.

Manihot Glaziovii (Ceara or Manicoba Rubber).—Fresh seeds available all the year round; price as per our Circular No. 31. It is superior to Mangabeira rubber and second to Para rubber.

Castilloa Elastica (Panama or Central American Rubber).—Seeds and Plants supplied; price and particulars as per our Circular No. 32.

Urceola Esculenta (Burma Rubber) and **Landolphia Kirkii** (Mozambique Rubber).—Seeds and plants, both are creepers.

Cinchona Seeds.—Different varieties.

Hybridised Maragogipe Coffee.—A larged-beaned superior variety of Coffee in demand; seeds.

Santalum Album (Sandlewood).—The cultivation and felling of the tree is entirely under Government monopoly in India, Sandlewoods to the value of over £100,000 being annually exported to various countries from India. The cultivation of this useful tree is now receiving increased attention in other countries; seeds and plants.

Eucalyptus Marginata (Jarra).—Large quantities of this most valuable timber are being annually exported from Australia to London and various parts of the world for street paving and other purposes. Price of seeds on application. 7,846 pieces of Jarra timber has already arrived for Ceylon use,

Seeds and Plants of Cinnamon, Nutmeg, Clove, Kolanut, Pepper, Cardamom, Vanilla. Arabian, Liberian and Maragogipe Coffee, Cacao, Tea, Coca, Fibre, Medicinal and Fruit Trees, Shade and Timber Trees, also Palms, Bulbs, Orchids, &c.

Our enlarged Descriptive Price List of Tropical Seeds and Plants of Commercial Products for Foreign Countries for 1899-1900 are now being forwarded to applicants in different parts of the world,

"South Africa."—The great authority on South African affairs of 25th March, 1899, says:—"An interesting Catalogue reaches us from the East. It is issued by William Brothers, Tropical Seed Merchants, of Henaratgoda, Ceylon, and schedules all the useful and beautiful plants which will thrive in tropical and semi-tropical regions. We fancy Messrs. Williams should do good business, for now that the great Powers have grabbed all the waste places of the earth, they must turn to and prove that they were worth the grabbing. We recommend the great Powers and Concessionaries under them to go to William Brothers."

A leading Planter writes from *New Hebrides* under date 17th January, 1899:—"I shall like a few more of your Catalogues to distribute through these Islands, as I feel sure many would place themselves in communication with you, did they know where to write for Seeds and Plants."

Our New Descriptive Price List of Seeds and Plants of Fruit Trees now being prepared and will be ready shortly.

Agents in London :—Messrs. P. W. WOOLLEY & Co., 33, Basinghall Street.
Agent in Colombo, Ceylon :—E. B. CREASY, Esq.

Telegraphic Address :
William, Veyangoda, Ceylon.
Lieber's, A.I. and A.B.C. Codes used.

J. P. WILLIAM & BROTHERS,
Tropical Seed Merchants,
Henaratgoda, Ceylon.

ANGLO-CEYLON AND GENERAL ESTATES COMPANY, LIMITED.

Report of the Board of Directors, presented to the Stockholders at the thirteenth annual ordinary general meeting, held at 20, Eastcheap, London, E.C., on Tuesday, July 18th.

The Directors herewith submit their Report, and the Accounts, for the year ending the 31st March, 1899.

The net profit, with the balance of profit carried forward from the previous year, as shewn in the audited accounts annexed hereto, amounts, after payment of the Debenture Interest, to £18,650 7s 10d, and the Directors recommend the payment thereout of a Dividend of 4 per cent. on the Consolidated Stock of the Company. This Dividend will, if assented to by the meeting, be payable on the 1st August, 1899, at the London Office of the Company's Bankers.

In Mauritius the prices for Sugar in the course of the year under review sank, owing to the collapse of the Indian Market, to the lowest point ever known. Fortunately, however, the crop was remarkably abundant, and the cost of production per ton of Sugar was from this and other causes considerably reduced.

Towards the end of the financial year the Indian Market revived to some extent, in consequence of the confidence inspired by the legislation of the Indian Government, by which the foreign bounties were countervailed; the Money Market in Port Louis became easier, and serious difficulties in the Island were averted. 141,619 tons of canes were handled on all the estates in which the Company is interested, producing a crop of 13,526 tons of Sugar as against the very short crop of 8,916 tons in the year 1897-1898.

It is hoped that a condition of greater stability will prevail in the Indian Sugar Market, favourable to Mauritius interests, as an effect of the legislation to which reference has just been made.

In Ceylon the crop of Tea from the Company's Estates fell very short of the estimate owing to the persistent drought and cold wind experienced throughout the tea growing districts; and it amounted to 1,566,812 lb., only as against 1,584,236 lb. plucked from a less area in the previous year. From the same causes the Cocoa crop was reduced from 2,100 cwts. to 274 cwts., being less than one-seventh of its predecessor. The drought caused considerable damage on the Cocoa Estates, and the mortality among the young coconut trees was large; the Cocoa trees in bearing, however, are now reported to be looking well, and the Spring crop just harvested is stated to be satisfactory.

The prevalence of higher rates of exchange, as shewn below, further reduced the Company's profits in Ceylon, which were accordingly much below those of the year 1897-1898.

The gross price of the Company's Tea was 8.59 pence per lb. in London as against 8.17 pence in the previous year, and the gross price of the Company's Cocoa averaged 70/1 per cwt., as against 71/- per cwt. previously.

The result of the working of the Estates in Ceylon and Mauritius respectively is given in the Profit and Loss Account, calculated at the average rate of exchange of 1/4¼, as against 1/3⅝ in the year 1897-1898.

The Chairman visited the Company's properties in Ceylon, the Straits and Mauritius, during the year, and the Board is confident that improved results will accrue from this inspection.

The condition of the Estates, both in Ceylon and Mauritius, is reported to be excellent, and the prospects for the current year to be encouraging. A statement of the acreages is given in the schedule annexed hereto.

Mr. Quintin Hogg, under the provisions of the Articles of Association, retires from the Board, and being eligible, offers himself for re-election.

The Auditors, Messrs. Welton, Jones & Co., also retire from office, and have expressed their readiness to act if re-elected.

TEA BLIGHTS—AND PLANT DISEASE.*

Just as we were about to publish a brief review of Mr. Massee's important little book on "plant diseases," there comes to hand a special circular by Mr. Willis on "Tea Blights" and how to deal with them, which we fully reproduce in our Daily and *T. A.* It will be very interesting now to compare what Mr. Massee and Mr. Willis say not only in description of the fungus pests affecting tea, but also as to "preventive means." Our tea planters are unusually fortunate in having the opinions of two such good authorities given simultaneously. We now proceed with our review of the book before us.

MR. George Massee, F.L.S., Principal Assistant (Cryptogams), Royal Herbarium, Kew, is recognised to be at the head of his own Department in reference to diseases caused by parasites of vegetable origin, and from India and Ceylon, again and again, have references been made to him in regard to fungoid or other pests affecting tea, cacao or other products. His text-book of Plant Diseases will, therefore, be widely consulted; and as it is thrown into the form of a handy book of reference and is, moreover, freely illustrated with descriptions and advice put into plain language, it is just the little book —costing under five rupees in Ceylon—that ought to be in the hands of responsible planters. The preface opens as follows:—

> The aim of this book is to enable those directly occupied in the cultivation of plants, and with but a limited period of time available for study, to determine the nature of diseases caused by parasites of vegetable origin; to apply in the most approved manner those curative and preventive methods which experience has shown to be most successful in combating the particular form of disease under consideration; and finally, to include in the daily routine of work precautionary measures which, without being costly, frequently prevent a slight disease from assuming the proportions of an epidemic

An instructive introduction may be gauged from the following summary :—

> Amount and kind of knowledge required by practical men—Familiarity with names and habits of parasites—Preventive measures—Cures—Rule-of-thumb methods of doubtful value.

And no less suggestive are the headings for the chapter on "Fungi":—

> Nature of fungi—Saprophytes—Parasites—Mode of growth of fungi—Reproduction of fungi—How parasitic fungi infect their victims—How the spores of fungi are dispersed—Modes of dissemination of disease that can be prevented—Danger connected with pruning—Selection of shade trees.

There are chapters on "Lichens," "Algæ," "Myxogastres," and "Bacteria." Of more general interest is what is said of "Fungicides":—

> Nature of Fungicides—Solutions—Powders—Bordeaux mixture—Ammoniacal solution of copper carbonate —Potassium sulphide solution—Iron sulphite solution—

* A Text-book of Plant Diseases caused by cryptogamic parasites by George Massee, F.L.S., Principal Assistant (Cryptogams), Royal Herbarium, Kew. London, Buckworth & Co. New York: the Macmillan Company, 1899.

Permanganate of potash solution—Sulphur—Lime—Resin wash—Jensen's hot water treatment for wheat and oat smnt—Paraffin—Formalin—Lysol—Resin componnd—Fumigation with hydrocyanic acid gas—Sterilising soil—Poisonous properties of fungicides.

After this we are treated to some "Economic Considerations" on "Statistics relating to losses caused by grain rust in Prussia—loss through rust of wheat in Australia—destruction of vineyards in the United States caused by fungi"; and to an account of "Various methods of spraying—spraying apparatus"; and still again to "Descriptions, with preventive and curative methods, of the various kinds of parasitic fungi attacking plants of economic importance." Various useful indexes conclude the volume.

But now, in regard to the two products and their diseases in which Ceylon is at this time most concerned, namely tea and cacao, we reproduce all that Mr. Massee has to say even at the risk of some repetition. Here are three pests of tea:—

"BLISTER BLIGHT" OF TEA PLANT.

(*Exobasidium vexans*, Massee.)

Dr. Watt, who investigated the pests and blights of the tea plant in Assam under instructions from the Government of India, says of the present parasite; 'One of the very worst blights on tea is known to the planters as Blister blight. I have seen hundreds of acres completely ruined by it.'

The fungus attacks the leaves, first appearing as a minute pink spot, which continues to increase in size: the under surface of the leaf at this point becomes depressed, forming a circular pit, a corresponding bulging out appearing on the under surface of the leaf at the same point. Several of these warts of blisters freqnently form on a leaf. The convex surface of the blister eventually presents a minutely velvety or woolly appearance, due to the formation of the fruit of the Fungus on the surface of the blister. The first fruit consists of small, one-septate conidia, which often commence germiuation *in situ*. These are followed by basidia, usually bearing two spores each. Sometimes fruit is also produced on the concave side of the blister.

When the disease has gained a foothold on the leaves, it also frequently attacks young shoots.

PREVENTIVE MEANS.—Dr. Watt states that the disease 'invaribly appears on tea that has not been pruned in the autumn. About April it extends to the prnued tea, which has by then come into leaf.' As to whether it would not be wise under the circumstances to prune all plants, lack of practical knowledge prevents me saying; however, the statement suggests that the mycelium is perennial in the branches, and produces the first crop of spores the following season, which are carried by wind to the pruned trees. In addition to collecting and burning diseased leaves, it is absolutely necessary to cut off all diseased branches.

Ascertain that the fnngns is not also present on wild plants in the neighbonrhood of the tea plantations.

Watt, *The Pests and Blights of the Tea Plant*, p. 419.

Massee, *Kew Bulletin*, 1898, p. 109, figs.

"GREY BLIGHT" OF TEA PLANT.

(*Pestalozzia guepini*, Desmaz.)

Said by Dr. Watt to be one of the most destructive and dangerous of parasitic fungi to which the tea plant is liable. It occurs in Assam and Cachar, and probably in all the tea districts of India, also in Ceylon. The disease first appears as minute, brownish-grey spots on the upper surface of the leaves. These spots gradually increase in size and coalesce, forming large, irregular blotches, which finally become grey and sprinkled with minute black points, the fruit of the fungus. During the increase in size the blotches are often bordered by a dark, slightly raised line. Diseased leaves are not at all blistered or swollen; in fact the grey patches are thinner than the uninjured portion of the leaf, owing to collapse of the tissues.

Dr. Watt states that the disease commences for the most part on one side of a bush, very often on the same side of all the bushes over an effected plot—a circumstance that may be taken as indicative of the germs having been wind-conveyed.

In addition to growing on the tea plant, *Pestalozzia guepini* also occurs as a parasite on other species of *Camellia* and on *Rhododendron* in India; in Europe it is not uncommon on cultivated camellias and rhododendrons. In the United States it also occnrs on introduced species of *Camellia* and *Citrus*, from whence it possibly passed on to the native *Magnolia*. Finally it is known to occur on indigenous plants (*Niphoblous*) in New Zealand, and on *Alphitonia* in Queensland.

PREVENTIVE MEANS.—The remarks I offered in the *Kew Bulletin* are repeated here. If the diseased leaves were collected with the amount of care and intelligence exercised in collecting sonnd leaves, and bnrned at once after being collected, the disease would soon be stamped ont, as the mycelium of the fnngus is not perennial in the tea plant; consequently infection and a recurrence of the parasite depends entirely on inoculation by the numerous conidia or reprodnctive bodies of the fungus present on diseased leaves. Remembering the very different kinds of plants on which the fungus is known to be parasitic, it is very probable that it also occurs on wild plants growing in the vicinity of the tea-gardens. If such proves to be the case, all such plants should be removed if practicable, as the conidia of fungi are carried considerable distances by wind, birds, and insects, and no amount of attention in the way of removing the parasite from the tea plants would avail if the supply of conidia requisite for inoculating the tea plants were formed on other plants growing in the neighbonrhood.

Watt, *The Pests and Blights of the Tea Plant*.

Massee, *Kew Bulletin*, 1898, p. 106, figs.

THREAD BLIGHT OF TEA PLANT.

(*Stilbum nanum*, Massee.)

Indian tea-planters have known this most destrnctive fungus for at least the last thirty years. The name 'thread blight' is given on account of the very thin strands or films of white mycelium that are firmly attached to the branches and under surface of the leaves of the tea plant. The mycelium also runs nnder the snrface of the branches, living in the tissues of the bark, and coming to the surface here and there to spread over the outside of the leaves and twigs.

The fruit only appears to be formed on very old, rotten branches that have fallen to the gronnd and become decayed, and resembles pins in miniatnre—a very slender stem and a round head, the whole not half a line high. Repeated observation proves the fruit to be very rare, and infection from spores may be left out of consideration, except in the case of reclaimed ground, where the trees have been neglected for some time.

The amount of evidence forthcoming seems to suggest that the mycelium travels nnderground, and first attacks the root, afterwards passing up the stem, either externally or internally, always finally coming to the surface.

PREVENTIVE MEANS.—It seems to be generally admitted that thread blight is common in the jnngle on various plants; and to prevent its spread to the tea plants, narrow trenches should be kept open. These need not be very deep, as underground mycelium rnns near the surface. By similar means, diseased patches in the plats should be isolated. Prnnings should be burned and not bnried, as each bnried mass may prove a centre of infection. If quicklime is available, and not in other respects injurious to the tea plant, a shallow trench should be made round the stem, filled with lime, or lime mixed with sulphur, and covered over with soil.

Spraying with Bordeaux mixture or with potassium sulphide would check the external spread of the mycelium on the plant.

Watt, *Pests and Blights of the Tea Plant*, p. 433.

Cunningham, *Scientific Mem. Med. Officers of Army of India*, pt. x. p. 20.

Massee, *Kew Bulletin*, 1898, p. 111, figs.

We now take over what Mr. Massee has to say on Cacao and Coffee diseases. As regards "Cacao," we are told of:—

CACAO POD DISEASE.

(*Phytophthora omnivora*, De Bary.)

This disease has been recognised for some years past but has recently become much more general and destructive to cacao pods in Trinidad. The same fungus is probably the cause of the cacao pod disease in Ceylon.

The symptoms of disease are a darkening of the 'shell' of the pod, which almost invariably commences at one end, and gradually extends over the entire surface. After a while the fruit of the fungus shows on the surface as a delicate white mould, often appearing first in the furrows on the surface of the pod.

The white mould represents the conidial form of reproduction, and lasts for some weeks, the numerous conidia produced being carried by wind to other pods, which in turn become diseased.

The mycelium of the fungus permeates and destroys the entire substance of the pericarp or 'shell,' and often also attacks the seeds. Numerous resting spores are formed in the diseased fruit, and are liberated when the tissue decays, when they germinate and start the disease the following season.

PREVENTIVE MEANS.—Spray with dilute Bordeaux mixture, commencing when the fruit is quite young, and continue at intervals as required.

Remove all diseased fruit from the trees, as when once attacked it is valueless, and only serves to spread the disease if allowed to remain.

Do not allow diseased fruit or shells' to remain on the ground in the plantation, as the commencement of the disease each season depends on resting spores present in such material.

The fungus is known to attack a large number of different plants; and it will be important to ascertain whether it is present on other plants in the neighbourhood of the plantation. Seedlings are often attacked.

The disease is most abundant in low, damp situations, or where the trees are much shaded.

Massee, *Kew Bulletin*, 1899.

CACAO DISEASE.

Mr. J. B. Carruthers, who has spent some time in Ceylon investigating the destructive disease attacking the cacao tree, has published his report, of which the following is a summary. The name of the fungus causing the disease is not given, but the account leaves little doubt that it is a species of *Nectria*, allied to the species causing canker in the wood of the apple tree.

The first indication of disease is a darkening of a patch of the cortex; if this patch is cut out it is found to be soft and of a claret colour and full of moisture. At a later stage minute white pustules appear, especially in cracks; these eventually become pink. During the white stage very minute oval conidia are produced in immense numbers, and later on larger, crescent-shaped conidia appear. Finally, when the cortex is dead, or nearly so, a third ascigerous form of fruit develops; the sporangia being globose, crimson, and grouped in clusters.

The disease often spreads rapidly; in one instance a diseased patch more than two feet long, and reaching almost round the tree, had formed ten days after inoculation.

PREVENTIVE MEANS.—The most satisfactory method is to cut out the diseased patch, along with a margin of apparently sound cortex. Covering the wound with tar is not recommended.

Carruthers, *The Tropical Agriculturist*, Nov. 1, 1898, p. 359.

Finally, here is how our poor old coffee and its bitter fatal foe are treated:—

COFFEE LEAF DISEASE.

(*Hemileia vastatrix*, Berk, and Broome.)

This terrible scourage, which was first observed in small quantity on a single estate in the Madulsima district, which occupies the south-western portion of the hilly country of Ceylon, is now widely distributed—India, China, Malay Peninsula, East Indies, Philippines, Natal, German East Africa, and probably wherever coffee is cultivated in the old world.

The leaves are most frequently attacked, spots being also sometimes present on young shoots and even on the fruit.

On the leaves the earliest stage of the disease is indicated by the presence of more or less circular, discoloured spots. These continue to increase in size for some time, retaining their irregularly circular outline, become pale yellow, and studded with bright yellow clusters of spores, which soon change to a bright orange colour. The patches show on both surfaces of the leaf, but the spores are confined to the under surface.

The spores are produced in dense clusters on the tips of hyphae which come to the surface of the leaf through the stomata. Those surfaces of the spore that are in contact when the spores are growing are smooth, whereas the outer, free portion of the surface is coarsely warted.

PREVENTIVE MEANS.—Very little success in this respect attended the efforts of those investigators of the disease, whose primary object was to discover, if possible, some means of checking the epidemic. Probably some of the modern fungicides, as Bordeaux mixture, etc., might prove more effective. Diseased leaves should be collected and burned on all occasions.

Full notes respecting the distribution of the different species of *Hemileia*, along with the dangers arising from want of discrimination in the selection of 'shade trees,' will be found on page 27 of this book.

Berkely, *Gard. Chron.*, p. 1157 (1869.)

Morris, *The Coffee Leaf Disease of Ceylon and Southern India.*

Marshall Ward, *Sessional Papers*; xvii., Colombo, Ceylon, 1881.

There are also two other "coffee diseases" reported, the account of which we may as well quote:—

COFFEE TWIG DISEASE.

(*Necator decretus.* Massee.)

Bursting through the epidermis of young shoots as minute white spots, which soon become orange-red and gelatinous. Said to be a destructive parasite on coffee trees at Singapore. Commencing at the tips of young branches and extending downwards. Removing diseased branches checks the spread of the disease.

Massee, *Kew Bulletin*, 1898, p. 119.

AMERICAN COFFEE DISEASE.

(*Stilbum flavidum*, Cooke.
=*Pistillina flavida*, Speg.)

This disease is almost as destructive to the coffee industry in the New World as *Hemileia vastatrix* is in the Old World.

The symptoms of the disease are unmistakable; circular whitish blotches occur on the leaves, often in considerable numbers, and are equally marked on both surfaces. Using a pocket-lens, very minute fungi resembling a minature pin in shape, and of a clear yellow colour, can be seen grouped on the spots on the upper surface of the leaf. The berries are also sometimes attacked, being marked with circular spots. On the young shoots the pale diseased spots are elongated.

The disease occurs in Costa Rica, Venezuela, Guatemala and New Granada.

PREVENTIVE MEANS.—Although by no means a new disease, no serious attempt appears to have been made to arrest its progress. Being quite superficial, it is quite probable that spraying with Bordeaux mixture, or with ammonical solution of carbonate of copper, would prove effective. All diseased leaves and fruit should be collected and burned, otherwise spraying is of little avail.

STILBUM FLAVIDUM, Cooke *Grev.*, 1890, p. 11.—Forming circular bleached spots on living leaves, the bleached patches pass quite through the leaf; sporophores occur on upper surface of the leaf, gregarious on the patches, very minute, entirely clear yellow, 1-2 mm high, stem

very slender, straight or flexuous, head globose; conidia elliptical or subglobose, 2-2·5 × 1·5-2 μ.

This is considered by Spegazzini to be a Basidiomycete, and renamed *Pistillina flavida*; however, I have failed to find basidia, and so prefer to retain the species under *Stilbum*.

These are but samples of Mr. Massee's valuable work which we have much pleasure in recommending to the attention of our planting readers,—a supply of the book is shortly expected.

TEA BLIGHTS.

CIRCULAR FROM THE ROYAL BOTANIC GARDENS, CEYLON.

Tea Blights.—The following notes on tea blights have been prepared at the request of Mr. F G A Lane, Chairman of the Planters' Association, and to a large extent in consultation with him. The immunity from disease that tea has enjoyed in so marked a manner for many years is now disappearing; many insect and fungus enemies, some of local origin, some introduced from Assam and elsewhere, are now attacking tea in many parts of the Island, and it behoves all interested in the cultivation to be upon the watch to recognize the signs of disease as soon as possible after they appear and to at once attack and as far as practicable eradicate the disease. The diseases are here, and all experience of cultivators in all ages and lands shows that such disease come to stay; they cannot be completely eradicated, but they can be kept in check if taken in time. Of course this involves a certain expenditure, but if the disease be early recognized and properly attacked this need not be large. Planters should make it a regular part of their work to learn to recognize the diseases and to teach this knowledge to conductors, kanganies, and coolies, and should remember that one diseased estate may reinfect all its neighbours in a few days, if there be any wind, and thus cause them much loss or trouble.

The two chief fungus blights that are attacking tea in Ceylon are the Gray Blight, well-known in Assam, and a blight which has so far only been noticed in Ceylon, and which I have called the Brown Blight. Both are now to be found in most of the districts, but the latter is the more common of the two. It is not always easy to distinguish without the aid of the microscope which of the two diseases is present in an affected leaf, but this is of less practical importance, as the effects of the two are the same, and also the methods to be adopted for their treatment. Several other fungi have been observed attacking tea, and careful watch should be given in case of any spread of these. When a disease is observed to be spreading, no time should be lost in dealing with it.

Gray Blight.—This disease is due to the attack of a parasitic fungus, known to science as *Pestalozzia Guepini*. It attacks tea in Assam, from which country it has very probably been imported with tea seed. It also occurs on camellias in India and Europe and on citrus (orange and lime genus) in America, as well as on other plants in various countries,

It is purely a leaf disease. It is found chiefly, if not only, on mature leaves, and does not affect the flush by direct attack, but reduces it by injuring the older leaves, on whose proper performance of their duties the rate of flushing largely depends. If many of the old leaves are attacked by the disease, the amount of flush may fall to less than half what it was before the attack.

The first thing to look out for is leaves showing dead portions. If part of a leaf is dead and shows a gray or brown colour, the probability is that it has been attacked by one or other of the blights we are now considering. Of course we know that drip of water on the leaf will produce this result, and it may also follow from the attack of insects, and sometimes from other causes. If the appearance results from any other cause than the attack of an insect or fungus blight, it is of little or no importance, is not infectious, and will not spread, and consequently the removal of the few leaves that may come under this category need cost little in time or trouble. The blights are foes of a different order, and spread so quickly, when once started on an estate that they should be at once attacked. Therefore, bearing in mind that the blights in question are present to some extent in nearly all the districts, it will be good policy for planters to make a point of getting all injured leaves plucked and destroyed, as explained below.

In the case of the gray blight, the injured portion of the leaf usually turns of a light gray colour, which is fairly characteristic of the disease. The edge of the injured part where it joins the green part of the leaf is usually dark brown, and the edge of the yet living part where it meets the dead portion is yellowish when held up to the light owing to the destruction of the green-colouring matter which is going on under the attacks of the fungus, which spreads from the dying portions into the living. When the fungus starts from one spore only upon the leaf, the disease appears as a small gray spot, which widens rapidly, but remains approximately circular, except where its growth is interfered with by the veins or edge of the leaf. Most commonly, however, the fungus spreads from several places at once and forms an irregular patch, which may at length occupy almost the whole leaf. The patch is, however, usually bordered by a dark line, behind which, in the dead portion, may often be seen other faint lines concentric with it. These when present are very characteristic of the attacks of blights. As the attacked part of the leaf dies, it turns grayish or whitish in colour on the surface. On the dying portion the spores or reproductive organs of the fungus are produced in vast numbers. Millions may be formed on one leaf, and each one may, if it reach the surface of another leaf, cause an attack of blight there. The spores are extremely small and light, and consequently float in the air like fine dust, and may be carried a long way by wind, especially in dry weather. One estate may thus easily infect others to leeward of it, though the wind belts, now so general, will tend to largely check this. When a spore reaches the damp surface of another leaf, it promptly germinates and a few days a patch of disease appear on the leaf and new spores begin to form.

Brown Blight.—This is also due to the attack as a parasitic fungus, which appears to be new to science, and has been named by Mr. G. Massee, of Kew, *Colletotrichum Camelliæ*. To the eye it closely resembles the gray blight: the chief distinction is that the attacked portions of the leaf turn to a reddish or chocolate brown colour as they die. The edge of the diseased part is, as in the case of gray blight, bounded by a dark line, and the adjacent edge of the green part of the leaf, into which the fungus is growing, shows a yellowish colour when held up to the light. The spores are chiefly formed on the under side of the leaf, and appear near the edge of the diseased portion as little reddish eruptions, about the size of a very small pin's head. In all other respects the appearance of leaves attacked by brown blight is practically much like that of those suffering from gray blight.

Other Blights.—Several other fungus blights may at times be found attacking the leaves of the tea plant, but the result is always much like that caused by the gray and brown blights—a more or less irregular diseased portion, the centre of which is dead and at the edge of the dark part an extension of the fungus into the still living portion of the leaf, which shows a yellowish colour where first attacked. One very common blight, found in all parts of the island, is the "Spot Blight," the affected leaves being covered with small, roundish gray spots, rarely as large as a 10-cent piece. This blight does less harm than gray and brown blights, but is troublesome enough, and is worth keeping down by the same methods as will be used for the others.

General Principles of Treatment.—When the disease has been recognized on leaves that have been largely damaged by it, a close study should be made

of the features described above, and early stages should be looked for on other leaves until the attack can be recognized at a very early stage, even before the gray or brown colour has begun to show (when this shows it means that that part of the leaf is dead or nearly so and is beginning to form spores to spread to new leaves). By tracing backwards this way a series of stages may often be found, and it will be seen that when the disease first begins it is indicated by the leaf at the points af attack beginning to turn yellow, especially at first upon the upper side. This appearance can be produced by artificially infecting the leaf with spores from a diseased leaf: the yellow colour will make its appearance in a few days after rubbing with a diseased leaf, unless it be very dry weather. This experiment is best tried indoors with a branch of tea cut and placed in water, and as soon as the leaves begin to turn dark-coloured they should be burnt before they can produce any new spores.

The general principle to be kept in mind in any attack on the leaf parasites we have been describing is this: the disease is confined to the leaf, and is not perennial there; to survive for more than a limited period it must be able to form spores, which may reproduce the disease on new leaves. If, then, we can destroy all leaves bearing the disease, we shall at oncereduce the extent of the attack very much. There will still be many spores about, however, and these will soon cause a fresh outbreak. If the new crop if diseased leaves be plucked and destroyed, a further reduction of the disease will be made, especially if the destruction be carried out before any new spores are formed. The next crop of disease will be smaller, and if we go on upon the same lines the disease may at length be practically stamped out. In theory this would be quite possible, but in actual practice the expense would be prohibitive, and we must simply do the best that can be done within reasonable limits of expenditure, remembering that the great object in view is to destroy all existing spores and prevent the formation of any new ones. Leaves begin to form new spores soon after the gray or brown colour appears, and leaves which drop from the bush will produce spores as they lie on the ground.

Methods of Treatment.—The chief measure recommended is constant plucking and burning of all diseased leaves. On most estates, at moderate or high elevations, the cold prevents the very rapid formation of new spores, and probably if the diseased leaves be plucked at the same time as the regular flush this will be found sufficient. On low-lying estates, especially in warm damp weather, or where the blight is very common, probably at first it would be well to pluck twice as often. The regular pluckers may be provided with bags, or special podiyans put on to pluck the diseased leaves.

The leaves should be taken off right at the base, so as to leave no portion in which the disease may continue to grow.

The bags or baskets used should be airtight, otherwise the spores on the diseased leaves they contain will be simply sown all over the estate as the bags are carried about.

The contents of the bags should be immediately burnt when brought in and never left lying about, and the bags themselves should not be kept anywhere that they may infect tea bushes. It would be well perhaps to disinfect them before putting them away by aid of a little Bordeaux mixture or other poison.

The pluckers should be instructed to pluck diseased leaves by taking hold of the healthy portion. If they touch the diseased part they will be liable to get a number of the spores upon their hands, and then afterwards they will deposit these upon other leaves. Remember that fungus blights are very infectious. Do not allow an uninjured leaf to be touched by a diseased one or by hands which have touched a diseased one, if it can be helped.

Plucking of diseased leaves should be done through the estate in the direction of the wind as far as possible. If the diseased leaves be removed from a field which has other diseased fields to windward of it, the former will be reinfected from the latter. Special care should be taken not to allow fields that lie to windward of other estates to become infected with disease.

If the ground be covered with dead leaves on a part of the estate where there has been blight, many of these are sure to be covered with spores. They should be swept up and burnt or buried with a little lime, say, an ounce for each bush.

Special onslaught should be made upon disease at pruning time. The diseased leaves, including those that show any sign of the yellowing above described, should be plucked and put with the prunings, and the whole, together with all dead leaves and twigs lying on the ground, should be burnt or buried. If a little manure is buried with the prunings their decay will be more rapid, and the fermentation set up will help to destroy the spores.

The most common method of attacking leaf parasites —spraying—is impracticable in most cases on tea estates on account of the steepness of the ground, the cost of application, and the great difficulty of getting a fine enough spray to cling to the hard glossy leaves of the tea. If only one small patch of disease is found on an estate, however, it might be worth while to spray the bushes there and all those round them, after plucking and burning the diseased leaves, with Bordeaux mixture, as described in the circulars on cacao canker. Care must be taken that the spray is so fine that it hangs in the air like a mist, otherwise it will form drops on the leaves and run off. The spray should be applied to the *debris* on the ground as well.

These notes have been hasitily put together from incomplete knowledge of the diseases as present in Ceylon. Planters would confer mutual benefit upon one another by making notes upon the extent of the disease, the methods tried for reducing it, their effect, and so on, and communicating these to me on my return towards the end of the year.

John C. Willis,
Director, Royal Botanic Gardens.
Peradeniya, June 6, 1899.

COCONUT PLANTING IN VEYANGODA.

A planter writes:—"We have not your quick growth of Rajakadaluwa to show. In this district, the soil, which is generally stiff, has to be quite conquered by the roots before the palms are in full bearing—or say 10 to 15 years to *come* into bearing, and 20 to 25 to get to *full* bearing, which should last 40 to 50 years under care and cultivation; and then the decline might commence. That is my idea and observation. Trees slow of growth last longer than quick growers—nature's compensation; and I believe our trees will last longer than those of Rajakadaluwa; but I agree with you that trees on soil like the latter can be maintained in good heart, long enough to be a really good investment by liberal treatment. In a reclaimed paddy field and in a sandy loam patch, my trees have come into bearing in five and six years, but that is exceptional. The village theory is that the trees here benefit by proximity to the clouds! This estate was opened in patches, first by Sir R. F. M., 27 or 28 years ago; then completed by H. D. Andree 17 or 18 years ago. Little was left for me; and my patches of five to eight years are very promising.

"My best recommendation for nuts here is that Mr. Jardine is a buyer of local seed. He took 4,000 last February, and last week we sent him 4,000 more. I wish the natives understood the exchange and improvement of seed better.

"My acreage in bearing is about 120 acres of coconuts, and I got 292,000 last year; and my June

crop this year was 92,000, so that I shall be safe for about 325,000 this year. I shall be quite content to get 750,000 nuts from my 250 acres; but prices here are generally good. Rajakadaluwa seems more hopeful; and the experience recorded with a 10-year plantation fairly justifies it; while mine is 18 to 28 years."

We have had the pleasure of visiting the estate referred to, and may add that the trees, doubtless as a result of utmost care expended on them, show an exceedingly solid build. The straightness of the trunks was remarkable, and, though slow of bearing, on the older trees almost without exception we saw fine clusters of large nuts. The grass beneath the palms seemed of excellent quality and kept exceedingly clean, so much so that it brightened up one's dimmer recollections of an English garden far more than the bare earth of the tea-field could ever do. The cinnamon shrubs looked exquisitely fresh and green, and the prospering verdant growth of these bushes seemed to drop into the place of the border of laurels beside an emerald lawn in the home country—the land of many a spacious park and smiling hedge-row.

THE FUTURE OF CINCHONA.

The note which we published last week regarding the trouble in the Company which established the Bandong Quinine Works, was fair evidence that all is not happy there, but more recent news which has come to hand indicates that the trouble has been smoothed, if not settled, and, a decision arrived at which will have a far-reaching influence upon the supply of cinchona bark and quinine to the world. On the 16th ultimo, a meeting of bankers and cinchona-planters was held at Bandong to consider the whole question of the export of cinchona and quinine, when it was decided to establish in Batavia a regular cinchona market, whence the bark will be sent and sold by auction to exporters. At the same time an agreement was entered into with the Bandong Quinine Factory, under which that Company agree to send to the Batavia market before the end of January, 1900, not less than 10,000 kilos. (350,000oz) of quinine sulphate for disposal by auction, and the Company also undertake to supply advance samples of the quinine, so that samples may be distributed to buyers in the neighbouring colonies, and in Australia in October next. These are the brief details which have come to hand by cable. Brief as they are, it will be seen that they embody a principle which has not hitherto been recognised by the cinchona planters, and it is evident that, if the planters are all in it, and stick together, the days of cheap bark and quinine under 1s per oz. are practically over. It is well known that the planters live by virtue of advances made to them by bankers and financiers, who have always grumbled at the want of control over the European markets. This new proposal seems to supply what they lacked, for it will at least give them the grip on the local market, and ensure minimum rates for the bark—always assuming, of course, that there is in Batavia a sufficient number of buyers to ensure the competition requisite for fair prices. The Java people have learnt by the incidents of this year that the world is practically dependent upon them for this indispensable drug, and although speculators are mainly responsible for the great appreciation of bark and quinine, the speculation was based upon the insufficiency of Java supplies. Seeing, therefore, that the supplies to the European market will, in future, pass through the Batavia gauge, and that that gauge will be controlled by those having pecuniary interest in keeping it big, it does not seem likely that we shall see a return to penny units. India and Ceylon are now out of the running in cinchona production. They cannot grow the rich Ledger trees for want of the suitable soil at the requisite elevations. Gradually India is dropping all the species except Officinalis, and although Mr. Standen's visit to Java may help him to more hopeful experiments on the Indian Government plantations, no market influence can be looked for from that quarter during the next dozen years—if ever. We are in the hands of Java, and the Batavians know it. When the new Convention comes into force the despatch does not say, but we imagine that it is forthwith.—*Chemist and Druggist.*

SCIENCE AND TEA.—Replying to various enquiries made by Sir Patrick Playfair, Dr. George Watt, Economic Reporter to the Government of India, has stated at some length his views in regard to the employment of a scientific officer for the tea districts. His remarks—says the *Madras Mail*—will be of considerable interest to planters throughout India, for they are an exposition of the need that there is, not for one scientist but for several. Dr. Watt says, in fact, that he would urge "that there is not scope for one scientific expert for a few years but for half a dozen for a life-time." As, however, it is improbable that the Indian Tea Association can afford to employ more than one, and as the Government does not appear disposed to do more than assist the Association in regard to one scientist, we need not at present travel beyond the question of what particular branch of agricultural science that one should deal with. After showing that one man could not be an expert in the several very important branches that need investigation in the tea districts of Northern India, Dr. Watt brings the matter to a point by saying that if funds will not admit of the whole question being dealt with, the Association should decide whether it wishes to secure a biologist (*a*) to investigate pests and blights and discover remedies; (*b*) to bring to light practical improvements in the quality and treatment of the plant, or (*c*) to suggest improvements in methods of manufacture. As regards the investigations conducted by himself in Assam, Dr. Watt explains that they lasted only two months and a half and were conducted in only one district—Assam. On the point of probable cost he states that if an officer were employed permanently, it might be possible to get a Doctor of Science with special qualifications in the chemistry of plant-life for R1,000 rising by annual increments to R1,500. If only engaged for a term of five years, the expert should receive not less than R1,500 a month, all expenses paid to and from India, and customary travelling allowances. A central head-quarters is desirable—Shillong, if work is to be conducted in Assam alone; if it is to extend to Darjeeling, the Duars, Assam, Cachar, &c., Darjeeling might prove to be the best place for the head-quarters laboratory, if Calcutta be thought too far off; but in that case there should be small laboratories also at Dibrugarh and one or two other centres. A distinct period of every year should be spent on tour, and every garden under the Association visited in turn. A hard and fast rule should also be made that every discovery made by the scientist becomes the property of the Association, and that he should not be allowed to patent any process or method within a fixed term of years.

PLANTING NOTES.

The Morowak Korale Tea Pest.—The further specimens of the devastating pest that has been at work on Silvakande, which we received—included as we stated several cocoons. These we submitted to Mr. Mackwood, as before, for inspection, and the verdict tells of the fertility of the pest. The fact that several of the 'caterpillars' are found clustering together in forming their cocoons shows that they have been allowed to spread far too prolifically. Other specimens of cocoons of the same pest have been received in Colombo today and a careful examination of them shows that the moths have escaped from *every one*! Nothing but the severest measures, cutting down the bushes and burning the prunings—cocoons and all, will prevent a large extension in the work of the "grub."

Planting and Agricultural Pests.—The absolute necessity for a Cryptogamist as well as Entomologist on the Government Staff is every day becoming more and more apparent. The sooner the "gray" and other blights are investigated on the spot, the better for all concerned :—*taxpayers and Government* as well as the planters. We speak unto wise men (if there are any such in the Executive),—judge ye what we say. A leading planter writes today on the serious character of the tea blight in some parts and the need of speedy investigation. He adds :—" Planters are burning and burying prunings—it must do good, but it will add to cost of production, and we do not seem to have any chance of a rupee less than 1s 4d. The only good thing about the rate is that it may check extensions into tea in India." There is plenty for Cryptogamist as well as Entomologist to attend to, in respect of the staple and other industries of the country.—Since writing the above the letter from Mr. Chas. Gibbon comes to hand, taking the same strong view with regard to cacao.

The Morowakkorale Tea Pest.—We have two interesting letters on this subject, and both writers consider that a caterpillar is responsible for the mischief described on the 10-acre field of Sylvakande estate. Mr. Geo. Thornton Pett identifies the insect as the *Parasa lepida* described by Mr. E. E. Green, while "Thosia Recta" considers another caterpillar of this name is to blame. One difficulty is to reconcile Mr. MacLean's description of the insect (and the absence of any sign of cocoon or moth) with either of these caterpillars. Mr. Pett refers to Nietner's *Limacodes Graciosa*, and we quote what he says in our daily and *T.A.* The only thing to settle the matter now is to get fresh specimens from the Superintendent of Sylvakande, and we are glad to see Mr. F. Mackwood mentioned as able to help in identification as Mr. Haly may be absent from Colombo. Mr. Mackwood is inclined to think the caterpillar must be the *Parasa*; but he can only be sure on seeing specimens which we hope will come by an early post. Meantime he advises the tea attacked to be pruned down to the ground and all the prunings burnt, lest there should be an outburst of moths flying all over the estates and depositing their eggs.

Tea Consumption in Germany.—Mr. Frederic Harford, Second Secretary in Her Majesty's Legation at Munich reports that the consumption of tea in Germany, which averaged ·05 kilo. per head up till 1897, rose to ·07 kilo. per head in 1898, and the imports of tea from 2,660 tons in 1897 to 4,116 tons in 1898. This increase is chiefly due, he says, to the import of tea from China, rising from 1,661 tons in 1897 to 2,593 tons in 1898, from which it would appear that Indian teas are not so much appreciated in Germany as Chinese teas. In any case coffee is still the national drink of Germany, and not tea, *which is twice as dear as it is in England.* [We italicise the last few words, as a hint to South Indian planters and Ceylon.—Ed. *T.A.*]—*Planting Opinion.*

The Tea Crisis.—Here is how the *Indian Daily News* refers to this subject. It will be observed that the system of "outside" sales in Calcutta is considered as more objectionable than the open sales of Colombo :—

Yesterday's Meeting of the Tea Association which was convened to "discuss the situation with reference to the stoppage of public auction sales of tea in Calcutta in connection with the proposal to abolish the 1 lb. draft allowance on teas sold by public auction in London," has afforded another sad exhibition of the lack of organization which has unfortunately distinguished the campaign so far. Nothing definite was decided upon, and as far as we can see, the meeting has only served to further impress buyers, and dealers' agents with the weakness of the growers' position. It was announced that the Ceylon men definitely refuse to stop the Colombo tea sales, thus affording the London dealers an easy means of filling their requirements.* How the Indian Association ever came to open the campaign, without first assuring themselves of the co-operation of Ceylon, is a pitiable example of the lack of the most ordinary business caution, and Indian growers, especially those who usually sell on the Calcutta market, have, we consider, a very genuine grievance against the Association, for the false position in which they have been placed. We understand the Committee have recommended a sale here next week for outside markets only, and meanwhile are wiring the London Association suggesting that sales and exports of Indian teas should be suspended for a fortnight. We are of opinion that these outside market sales are a great mistake, and should not be held. If sales must be held then have them open as in Ceylon. There is no doubt that at present Calcutta sellers are greatly dissatisfied at the way their business has been upset by the precipitate action of the Association, more especially as the majority of the Committee are not interested in this market, and are hurrying their crop to London, where the trouble will probably have ended one way or the other, by the time the teas arrive. Failing combined action, such as we have suggested by suspending all sales and shipments, we think the Association should immediately throw up the sponge and let the auction sales go on as before. If it be desirable to put an end to the system of giving 1 lb. of tea per chest to the London dealer, the sales in that city can be made under the condition that this privilege is to cease. This only means that buyers will give a proportionately lower price than they would have paid had the 1 lb. been given. The matter is as long as it is broad and makes no difference to the growers. What is urgently required is a campaign against the wharves, the successful issue of which would help both growers and dealers. Why does the Association shirk this duty? For no selfish reasons we hope.

* Not so easy as our tea sales have been very limited in quantity and chiefly for the benefit of other countries than Great Britain.—**Ed. *T.A.***

THE PINE HILL ESTATES COMPANY, LTD.

The sixth ordinary general meeting of this Company was held on the 11th, Aug. in the office of Messrs Mackwood& Co. Mr. Bowle-Evans occupied the chair [and the others present were : Mr. T B Campbell, Mr. McGillivray, Mr. R E Prance ; by proxy Messrs. Yeoll Thorne, Frederick Hunter, S H Dyer, Mrs. J Kennedy, Mr. C D M Hunt, Mrs. Prance, and Mrs. E L Owen.

The report was submitted as follows :—

The Directors have the pleasure to submit their Sixth Annual Report.

The unsuitable weather experienced on the estates both in the first and second halves of the year has resulted in a considerable shortage of crop, 124,000 lb., being manufactured against an estimate of 150,000 lb., exclusive of bought leaf.

In spite of this, the profit and Loss Accounts after writing off fifteen per cent for depreciation on machinery, shows a balance of R10,627·77

Which the Directors propose to use in paying at once a dividend of five per cent, absorbing R10,437·00

And carrying forward to the present season .. 190·77

——— R10,627·77

NEW CLEARING.—The 101½ acres has been nearly completed, and the Visiting Director reports that the work has been carefully carried out.

The Directors are of opinion that improved Teas might be made in a larger and better equipped Factory, and as this new expenditure will be necessary in any case when the new clearing comes into bearing they have authorised the expenditure of some of the uninvested capital on Factory extension, machinery and water-course. The work has already been begun and the estimate of cost is R12,200·00.

The Directors in view of shortfalls of crop in recent years, think that a regular system of manuring should be adopted, and suggest that one-third of the Estate should be taken in hand annually. Ninety acres for this year has already been begun.

According to the Articles of Association Mr. H. St. C. Bowle Evans retires from the Board of Directors, but being eligible offers himself for re-election.

On the motion of Mrs. KENNEDY, seconded by Mr. DYER, the report was adopted.

On the motion of Mr. PRANCE, seconded by Mr. CAMPBELL, a dividend of five per cent was declared.

Mr. Bowle Evans was unanimously re-elected a Director as was Mr. Guthrie an Auditor, and the proceedings terminated.

CEYLON INVESTMENT ASSOCIATION.

GENERAL MEETING.

The ordinary general meeting of the Ceylon Estates Investment Association, Limited, was held recently.

Mr. Robert King, Chairman of the Association, presided. In submitting the annual report, the Chairman said that the result of the year's working was £344 better than the previous year. It was still disappointing, however, owing entirely to the smallness of the crop through unfavourable weather. The crop for the past year was 237,152 lb., as against 255,820 lb., a decrease this year of 18,668 lb. While the crops were smaller, however, prices had been higher. For the current year the crop harvested since 1st April was 13,172 lb in excess of that harvested for the same date last year, so that, if it only kept up, the future prospects were very good.

The report was adopted.—*Dundee Courier.*

THE SCIENTIFIC OFFICER FOR THE TEA DISTRICT.

VIEWS OF DR. WATT.

The following is the text of the letter from Dr. Watt to Sir Patrick Playfair on the subject of a scientific officer for the tea district :—

DEAR SIR PATRICK PLAYFAIR,—I shall answer your enquiries categorically. You ask my opinion regarding the proposal to employ a Scientist to investigate numerous difficulties connected with the cultivation and manufacture of tea. Hitherto I have been consulted mainly as to the employment of an officer to investigate the problems that hinge on the pests and blights of the tea plant. It is true these would be very nearly covered by the investigation of the difficulties connected with cultivation, but I presume are altogether unconnected with the problems of manufacture. It would thus seem to me that the first step would be to definitely fix the field of operations contemplated for the proposed Scientific officer. If the Association expect to find a man capable to deal as an expert with every aspect of tea I venture to think that they are mistaken. It might be possible to secure a Biologist who could conduct useful and practical investigation into pests and fungal blights of the tea plant (but even here Entomology and Mycology are two widely different studies, and no single person can be an expert in both sciences). But that a Biologist could be an expert chemist at the same time, is contrary to all experience in such matters. Some few years ago the Association brought to India a chemist (Mr. Bamber), and he furnished a report which no doubt most of the members of the Association have read. Its practical value is, therefore, a point I need not deal with. At the present moment the Ceylon planters have engaged Mr. Bamber as Chemist, but they have secured also the services of Mr. E E Green, an Entomologist of the very highest European repute. Mr. Green is himself a tea planter of many years' experience, but has consented to become Government Entomologist mainly with the view to devote his entire energies to the investigation of the pests of the tea plant. With a Chemist and Entomologist at work, Ceylon may reasonably hope to make some progress, but I do not look with much favour to a scheme that would secure one officer, in the hope that he would be an expert on every scientific problem of tea planting. I should, therefore, recommend the Association to carefully consider whether they want a Chemist or Biologist as the first and most important consideration.

You ask me whether I approve of the proposal. Yes I do, subject to the qualification involved by the above remarks. That those responsible for the tea industry should bestir themselves to (*a*) discover remedies for the pests and blights, (*b*) to bring to light practical improvements in the quality and treatment of the plant, and (*c*) to perfect their methods of manufacture seem to be truisms that I should hardly be asked to state. I know of no industry of a similar magnitude where empiricism is allowed to have such limitless sway. In my report I have given numerous illustrations of diametrical opinions held by well informed and successful planters on almost every aspect of the industry. And this statement is admissible because of the immense capabilities and vast powers of endurance of the plant. Both opinions may be equally wide of the mark and the profits obtained far short of the practical possibilities. But there is a limit to this blindfold trusting to Providence and to the endurance of the plant, and that limit, in my opinion, is not very remote. I would, therefore, urge that there is scope for not one scientific expert for a few years but for half a dozen for a life time. If funds will not admit of the whole question being dealt with, the Association should decide whether they wish to secure a Biologist to investigate (*a*) above, or an Agriculturist to enquire into (*b*) or a Chemist to suggest improvements in (*c*).

You next ask me, could the officer work in connection with my Department. I have no doubt he could, and that I should be able to suggest many lines of enquiry that would save him from much loss of time through fruitless investigations. I was asked a similar question on a former occasion, and the Government of India submitted to your Association the appended passage from my reply (of which for convenience of reference I furnish herewith a copy). It will there be seen that I assumed chemistry was to be the primary qualification of the officer. That I also proposed (para 5) his association with the laboratory of this office, but that he would require several other laboratories and a camp laboratory to conduct investigations while on tour through the tea districts.

You next ask me how far my investigations would render the employment of such an officer desirable or unnecessary. My personal investigations were conducted in one province only—Assam. They lasted for $2\frac{1}{2}$ months, and were and are now intended purely and simply as denoting the urgency of the work. If they serve the further purpose of affording a useful programme for detailed and final operations they will fulfil all that I ever contemplated. I may add, however, that my report has been so favourably received that I have been looked upon as more or less an expert and have been constantly consulted, since its appearance, by planters all over India. As the result, much new information has been brought to light, so that already a second edition (if called for) would be a considerable improvement on the first.

What remuneration should the scientific officer receive?

The answer to this question turns on the term of years for which employed. If the Association were to seek for the services of an officer to be permanently employed the course which I should recommend—it might be possible to get a doctor of science with special qualifications in the chemistry of plant-life for R1,000 rising by annual increments to R1,500. This appointment would of course carry no pension, therefore would have to commence at a higher figure than would be the case with a Government servant. But if the appointment is to last only five years and it is desired to secure an officer of made reputation, the Association would have to offer not less than R1,500 a month, with all expenses paid to and from India. The Government of India engaged an agricultural chemist and paid R1,500. That circumstanc, I think, is a fairly good reply to the question you put to me. Of course whether permanent or temporary, provision would have to be made for travelling-allowance, framed on the scale granted by Government to its servants, *viz.*,—double first class ticket by train or steamer. This covers servants, excess luggage, etc. A halting allowance of R5 a day while away from head-quarters should also be made. In Assam everything is very expensive, hence the rates allowed in that province are higher than in most other provinces. The planters would no doubt assist the Scientifice officer very greatly, but I may say that with all the assistance rendered to me, I was out of pocket by my tour in Assam, over and above the allowances made to me according to rules under which I come. I mention this circumstance in order to show that the scale I have proposed is the lowest possible rate that should be contemplates. In some instances Government commutes travelling allowances into a monthly grant, but I should think the Association would be safe in putting down R300 a month as sufficient to cover these charges.

Where should his headquarters be? That is a very difficult question to answer. Were he to be employed in Assam only I should instantly have said Shillong. There is no occasion that he should be confined to an unhealthy climate, or one in which laboratory work would be difficult if not impossible. But as he would, I presume, have to investigate tea in Darjeeling, the Dooars, Assam, Cachar, etc., Shillong might not be the most central. I half think that if Calcutta itself was thought too far off, he might be located in Darjeeling. But he should have a small house with laboratory constructed in Dibrugarh and in one or two centres as well. I should insist that he spent a distinct period of every year on tour and visited in turn every garden under the Association. I should also lay down a hard and fast rule that every discovery he made, connected with tea, became the property of the Association. In other words he should not be allowed to patent any process or method within a fixed term of years.

I think the above fully disposes of all the questions raised by you, but if there were other points on which you wish my opinion, I shall be happy to be of service.—*Planting Opinion*, July 22.

WHITE SPOTS ON PASSION FRUIT.

Mr. A F T Somerville, of Kurrajong Heights, mentions, that nearly all the passion fruit in his district is affected to some extent by a little white spot. Mr. W J Allen, Fruit Expert, reports, that the spots are due to a fungus disease, which may be kept in check by spraying occasionally —when the fruit is small—with Bordeaux mixture, and later with ammonia carbonate of copper. The vines should be pruned well back once a year and receive in all three or four sprayings. Such treatment will entirely prevent the appearance of the disease.—*Agricultural Gazette*, July.

FERTILIZERS FOR FRUIT-TREES.

The manuring of fruit-trees has recently undergone considerable modification, it having been found that the plant food whose application is most beneficial is potash, and that it pays best to considerably increase the amount of this ingredient, the phosphoric acid and nitrogen being of less importance. It is better to limit the amount of nitrogen applied, and to apply this ingredient in quantity only if the tree requires it, and then in the form of a top-dressing, before the flowers are out, and not at a later stage. All manures for fruit-trees should be well worked into the soil.

For Citrus Fruits.

No. 7.

	Quantity per half ton. lb.	Cost. £ s. d.
Bone dust	520	1 3 3
Superphosphate ...	250	0 10 6
Sulphate of potash ...	350	2 7 3
	10 cwt	£4 1 .

This contains—

Nitrogen...	2 per cent.
Phosphoric acid ...	$15\frac{1}{2}$ per cent. (4 per cent water—soluble).
Potash	18 per cent

Apply at the rate of 4 lb. per young tree, at a cost of little under 4d per tree, or £1 12s per acre of one hundred trees.—*Agricultural Gazette* (New South Wales), July.

THE COORG COFFEE CROP.

The official forecast of the coffee crop in Coorg for 1899-1900 is calculated at $1\frac{1}{2}$ cwt. per acre for European estates and $\frac{1}{4}$ cwt. per acre for Native estates, and it is estimated that the total out-turn will be about 2,800 tons—2,100 from European and 700 from Native esates. The estimated average yield per acre of ordinarily well-cultivated coffee in full bearing for the present year is only 2 cwt. as against 3 cwt. last year. Last year's yield was estimated at 4,200 tons, and the toll-gate returns showed that $4{,}134\frac{1}{2}$ tons had been passed through. The amount of coffee exported during the ten previous years was 33,268 tons, or an annual average of 3,326 tons. No particular reason is assigned for the comparatively small crop expected this year.—*M. Mail*

Correspondence.

To the Editor.

MOROWAK KORALE TEA PEST.

July 27.

SIR,—The caterpillar alluded to as having done damage on Silvakande is most probably *Thosea Recta*. If the Superintendent will examine his bushes, he will probably find that a certain number of the caterpillars are spinning their cocoons. If he places a few cocoons in a box, he will (after they hatch out) be able to identify the moth, or butterfly. This is small and insignificant, but, if observed in large numbers, a look-out should be kept in the spots where they are seen; and the trees (on which the eggs are laid) pruned down, and the prunings burnt *before* the caterpillar hatches out. Prevention is better than cure, which is difficult. As the caterpillars can only crawl, a cordon of quicklime is about the best thing to stop their advance with. Carbolic spray and disinfectants appear to be of very little use. When the caterpillars begin to spin up their cocoons the affected bushes should be pruned and all prunings burnt.

The writer has seen two severe attacks in 1885 and 1897, on different estates at 1,500 odd feet elevation. In neither case was there any repetition of the attack in the following year. Neighbouring estates (rather than the one attacked) should be on their guard.

Mr. Frank Mackwood could probably tell a good deal more than the writer about this pest.—Yours, &c., THOSEA RECTA.

THE TEA PEST AT MORAWAK KORALE.

Pati Raja Estate, Elpitiya, July 23.

SIR,—Is it not possible that the tea pest now reported to have done such damage in the Morawak Korale is the blue striped nettle grub (Parasa lepida) described on page 66 of a little book by E E Green, called "Insect Pests of the Tea Plant," published by the "Independent" press in 1890. Mr. Green mentions that Nietner included the pest under the name of Licomodes graciosa, in his "Enemies of the Coffee Tree." Will you kindly look up Mr. Green's article on this pest and reprint it if you think the description applies.—I am, etc.,

GEO. THORNTON PETT.

THE BLUE-STRIPED NETTLE GRUB (*Parasa lepida.*)

There is a family of caterpillar (the *Lima* colidæ) many species of which are armed with stinging hairs, and which for this reason may appropriately be called 'nettle grubs.' There are several kinds that feed upon the tea plant, the most conspicuous amongst them being the larvæ of the *Parasa lepida*. They are gregarious and are sometimes present in such large numbers as to completely defoliate the trees upon which they are feeding. A neighbour who sent me specimens told me that more than fifty of them had been removed from two adjacent tea bushes, in another instance a group of four or five trees were left quite bare, and the superintendent, seaching for the cause of the mischief, received practical demonstration of the stinging properties of the caterpillars.

The same species is frequently found on coffee and occasionally upon cinchona trees. Mr. Nietner included it, under the name of *Licomodes graciosa* in his catalogue of "Enemies of the Coffee Tree."

Upon the first occasion that I saw a cooly stung by this caterpillar, I had the curiosity to experiment with it upon myself. I touched it lightly with the back of my hand and immediately felt a sharp stinging sensation similar in kind to, but rather more intense than, that produced by the common stinging nettle. Small white lumps were raised where the poison had penetrated the skin. The pain though severe at first did not last very long.

The eggs are generally attached to the under surface of the leaves. Their form and colour make them very difficult to see. From fifteen to twenty are laid together closely overlapping each other like the scales of a fish, which they resemble also in their flattened oval shape. They are almost transparent; the dull-yellow ring-shaped embryo can be seen through the shell.

The full grown larva is of a brilliant yellow green colour, with a rich lilac stripe along the middle of the back, and a bright blue stripe on each side, each stripe bordered by a darker line of the same tint. The poisonous spines are arranged in tufts along the body: they are pale green, four tufts near the head and another pair near the tail tipped with SCARLET: there are four large black spots at the hinder end of the body.

Specimens of this kind of caterpillar that have been feeding upon tea are much more brightly coloured than those that have been reared upon coffee leaves. The latter are ornamented with green stripes and shines upon a pale greenish white ground, they might easily be mistaken for a distinct species. Another peculiarity of these caterpillars is the rudimentary condition of their legs. *Their movements are more like those of slugs and snails than of ordinary crawling insects.* The cocoon of the 'nettle-grub' is hemispherical, of a dark brown colour, closely resembling the tea stems upon which it is usually placed. It is thin but very compact, formed of silk strengthened with a tough cement secreted by the insect.

The moth escapes from the cocoon by a lid-like opening at one end. It is a gaily coloured insect; its front wings are chocolate-brown with a broad emerald-green band stretching obliquely across them, the hind wings buff, tinged with chocolate at the margins; front and side of the thorax emerald-green, and a small spot of the same colour at the base of the two front legs.

As in the case of most of the leaf-feeding caterpillars, the injury to the tree is only temporary. The grubs when found should be removed and destroyed, but, under the circumstances, some other method than 'hand picking' will be found advisable.

July 29.

DEAR SIR,—The Superintendent of the estate attacked is apparently satisfied that it is the 'nettle-grub' described by Mr. E Green, and so-called on account of its painful stinging capabilities. The term 'grub,' by the way, is rather misleading, as it is usually applied to caterpillars which live underground. The 'nettle grub,' which is occasionally found feeding on cacao trees, and is apparently slowly increasing on that product, may easily be identified by its *excreta* which are cup-shaped. If the Superintendent of Silvakande is right, his simplest remedy is to prune every branch of tea, or other vegetation, on which either the caterpillars or cocoons can be found, and burn them before the moths emerge from their cocoons and a new brood developes. The caterpillars when disturbed cling very tightly to the leaves instead of dropping, as many species do, to the ground.

There must be something wrong in the condition of the affected tea fields to predispose them to such wholesale devastation as has been described, and the forking of the soil and the application of lime and wood ashes would probably be of great

benefit. Every tea-field in the neighbourhood should be carefully examined for caterpillars and cocoons. Specimens should be distributed through the district, especially to native gardens.—Yours faithfully, STUDENT.

B. C. AFRICA : TEA AND COTTON.

REPORT OF EXPERTS AS TO QUALITY.

Mlanje, B. C. Africa, June 9, 1899.

Dear Sir,—I send you a report on tea and cotton grown here, which may be of interest to your readers. The tea was rolled and fired by my cook in the oven, so that would account for any defects in the samples sent home. I have for some years made tea from time to time, and my servants know how to do it as well as I do; but the African Negro wants more looking after than the Asiatic: in fact you can never trust the best of them.

Mr. Moggridge made some very nice tea quite as good as your medium elevation teas from some leaf grown here and pronounced it a very good marketable article, and this gentleman has had considerable experience, at least more than I have had, of tea in Ceylon. I am going in for extending in tea, and have considerable nurseries laid down. So Ceylon may have a dangerous competitor in the course of years in this country, for our climate and soil is A1 and our labour average only 1½d per diem.

Many planters in British Central Africa would plant tea if they could get the seed into the country. The Nyassaland Co. imported a lot of seed with praiseworthy enterprise, but it turned out a failure as not a single seed germinated.

The only tea in this country is from a few plants originally imported by the Blantyre Mission and Mr. J. Lindsay of Limbe estate, who got his lot from Messrs J. P. Williams Brothers, of Henaratgoda. This is a good hybrid, but the jât does not come up to most of the teas I have seen on estates in Ceylon with fine large dark green leaves; but it is quite good enough and seemingly quite suited to our climate. H. B.

Copy.

41, Mincing Lane, London, E.C. Dec. 22, 1899.

Dear Sir,—In reply to your letter of yesterday we have to report that on examination of the accompanying samples of tea from Thornwood estate, Mlanje, British Central Africa, we find them to compare unfavourably with the low grades of East Indian British grown and Java teas.

The sample of No. 1 is a very small one, but it appears to be rather better leaf and not quite so mixed as No. 2, and in the present strong market for the lowest grades would be worth 4¾d or 5d per lb. in bond. No. 2 is an unassorted tea rather rough in leaf worth about 4½d or 4¾d per lb. The liquors of both are practically identical, being thin and flavourless, but quite clean and marketable.

The defects in the teas, both as regards leaf and liquor, are, however, in our opinion capable of removal and appear to be due rather to faulty manipulation than to any lack of virtues in the leaf. In the first place the plucking does not seem to have been very carefully performed, there being too much stalk and a coarse leaf. Again neither withering nor fermentation seems to have been satisfactorily carried out. From the brown appearance it would appear to have been withered too long and to have been *dried* rather than *withered* and the fermentation seems to have been very irregular. A few of the infused leaves are of a good *coppery* colour, but the general appearance of the outturn is too dark, although in some measure this is due to some of the leaves having been scorched in the firing; a lighter fermentation however would we think, give more point and pungency to the liquors. The rolling process also does not seem to have been quite effectual enough. If after withering the leaf, the leaf had been rolled sufficiently hard, enough to break the cells of the leaf, the made tea would have drawn stronger liquor and have had a better "twist."

With due attention to plucking and manufacture we see no reason why the tea from this estate should not prove of good commercial value.

We are etc., (signed) Wilson, Smithett & Co.
The Director of the Royal Gardens, Kew.

Copy.

Secretary, Manchester Chamber of Commerce, to Royal Gardens, Kew.

Iam now able to report to you upon the sample of raw cotton from Mlanje, British Central Africa, received from you a short time ago.

The gentleman by whom it has been examined states that it is very difficult to form an accurate judgment of the quality and market value of cotton in the seed. This you can readily understand since the process of ginning alters, often substantially, the characteristics of the cotton-especially with regard to the length and evenness of the "staples" and the presence or absence of impurities.

With this reservation the report is that the sample represents a long silky and fairly strong fibre and that in the ginned state it would be worth in Manchester today from 3½d to 3⅝d per lb.

"A BAMBOO IN BLOSSOM."

Dea Ella, Madawalatenne, July 21.

Dear Sir,—Not long ago I read in one of the Ceylon papers that a bamboo (Ceylonese unagaha) in blossom was a rare curiosity. Is this true? I have seen a bush on this estate blossom almost yearly, and even today I got one brought to the bungalow, simply because I read it was a thing worth possessing. Would any of your observant readers kindly let me know if they had ever experienced a thing like this?—Yours faithfully,

W. L. VAN D. S.

[We read in *Tropical Agriculturist* of September 1881 that "Bamboo blossoms every 15 years." Let our correspondent collect seed carefully and send it to the Director, R.B. Gardens, Peradeniya; also some flower specimens. As regards the dwarf mountain bamboo and other small species, the late Dr. Trimen thought they might flower yearly. Not so the larger kinds.—Ed. *T.A.*]

GALLE AGRI-HORTICULTURAL SHOW: A CORRECTION.

Kollupitiya, 31st July, 1899.

Dear Sir,—The gold medal for the finest plumbago in the Island was awarded to me at the Galle Agri-Horticultural Exhibition and not to Mr. A. P. Perera, as was stated by a mistake in the local papers recently. He is the manager of my branch establishment at Galle, who on my behalf sent the article for the Exhibition.—Yours truly, N. D. P. SILVA.

MR. CARRUTHERS: GOVERNMENT CRYPTOGAMIST.

Dear Sir,—At last Cacao is to have another innings after all. Now that we have influential men at home alive to the importance of Ceylon having its own Government Fungologist, we may hope the N.D.P.A. will forward on a strong resolution promptly, and urge the importance of Mr. Carruthers' immediate return as Government Cryptogamist. *Immediate*, because the year before last he, arrived rather too late for N.-E.

monsoon work, when the canker fungi flourish most, and we want him *in the island* early in October.

The Chairman, N.D.P.A., should call a general meeting at once as there are other important matters for discussion: Rinderpest, Murrain; Cruelty to animals; Cacao traders licensing; Supply of medicines to dispensaries; Road-metalling and Labor Federation district rules.

I hope the Kelebokka, Madulkele, and Knuckles men will rally to our aid now, if they do not wish to follow the example of Rangala, and join and strengthen the Northern districts. Unity among ourselves and the Spirit of Federation is all that is wanted to reduce labor troubles to a minimum.—Yours truly,

CHAS. GIBBON.

THE TEA DUTY AND DIRECT SUPPLY.

London, July 21.

Dear Sir,—In regard to the question of the sale of tea in this country, the demand of the one pound on each package is a remnant of an old regulation which ought to be done away with. It is what is called in China a "squeeze." I have no doubt you will have one of Messrs. W. J. and H. Thompson's circulars, and under the head of "Ceylon" you will see that, although there was not much sold in the room, still the sales went on, and I am convinced that if independent sales were made of tea at 14 days, the same as other produce, the planters would find it greatly to their advantage. The old regulations of giving long credit, added to the loss in the docks, and the sweepings, all go to reduce the return to the planters. It is well-known that it answers remarkably well the purpose of houses here who nurse their tea along, to effect private sales. The Customs arrangements favour the liberal free trade in tea, and anyone who purchases tea in Ceylon or in India can have it through the Customs, and as soon as the weights are known and agreed, there is no necessity for re-packing or bulking, and you take delivery without any loss whatever. There is a very strong feeling in England at present that the Government will have to yield on the question of duties, and if they do not take off the 4d at any rate that 2d will be knocked out in the next budget, to be followed in a later budget by another 2d. The public are getting enlightened on the subject of tea, and they see in the Press that such a large proportion of tea is sold at 6d to 8d per lb. in bond and they are well able to calculate that 4d duty means 50 per cent., which is considered not only a frightful tax upon the consumer but that it militates very much against the producer in India and Ceylon. There is no doubt but that the large firms here who are getting their own warehouses will reap enormous profits when tea is free.—Your truly,

THO. CHRISTY.

A PLANTAIN PEST.

Dear Sir,—I am somewhat surprised that none of the public have called attention for the fact that you can seldom now get a bunch, or even a "ring," of plantains without many of them being more or less diseased, the disease showing itself as a dark brown spot, penetrating from the skin into the fruit. Is our tea pest to be supplemented by a Plantain Pest? Will any of our scientists look into this matter, and advise as to what should be done? Pity it is that our Botanical officers do not bestow a little attention to our native friends or rather island fruit, and vegetables and endeavour to improve them. Then our Agri-Horticultural Shows would be worth,—so far as these products are concerned, going to see.—T.

The Gold Prospecting Syndicate.—The representative of the Syndicate in Ceylon, Mr. Goldie, has we learn, ceased operations for the present in the Rakwana district, where he has been working for the last year and more with "Lockhart's Patent Separator," but he hopes to recommence work again shortly. In many respects, we learn, the Separator has exceeded the expectations formed of it, and it is capable of dealing with 40 to 50 tons of gravel a day. The trouble has been in finding sufficient *illum* to feed it, for it has not been possible to work more than one pit at once, as the mines requires European supervision to prevent theft, and Mr. Goldie has only one European assistant. The sifting of the residum supplied by the eight separators keeps Mr. Goldie pretty busy while the machine is at work; while it is also necessary to see that the separators are not fed too fast, or with unsuitable gravel, for in such case they stop working automatically. Mr. Goldie has sunk his pit as deep as 120 feet, and says he could go to 200 feet with his present appliances, but after that ventilation would be necessary. Great credit is due to those who, like Mr. Goldie, have sunk money and given their time and abilities to put our mining industries on a better footing, and we trust they will receive valuable assistance from the geological survey of the island which Mr. Oldham has come down from India to see about.—Local "Times."

Strange Recovery from Snake-bite.—A remarkable case of recovery under the "Calmette" method of dealing with snake-bite, we hear, has recently occurred at Meerut under the care of Major Rennie, R.A.M.C. Since the introduction of this remedy, some three years ago (the first case treated in this country was, if we remember aright, also at Meerut), its efficacy has been abundantly proved by experiment in the laboratory and also in actual practice; but the present instance is specially noteworthy in that it would seem to demonstrate that the serum may be used with success in an apparently hopeless case, the patient, we are informed, being practically in the last stage of all when he came under treatment. It should be noted that the evidence of the poisonous nature of the snake is absolutely unquestionable, though the reptile was not actually caught. The well-known symptoms of the poison had fully developed themselves; in fact to such an extent that the patient was to all appearance dead, and was kept alive only by artificial respiration until the serum remedy had had sufficient time to permeate the whole system, and counteract the colubrine virus. This fact is vouched for by six medical officers, amongst whom was the Civil Surgeon, and the case was also seen by the Commissioner and by the Cantonment Magistrate, who, although not professional men, are men of long experience in India.—*Pioneer*, July 21.

KANDAPOLA TEA COMPANY.

The report of the directors for the year ended December 31st last, states that the profit and loss account shows a profit on the working of the estates of £1,843, and adding transfer fees and the amount brought forward from last year, there is a total of £2,103. The directors paid during the year the interest on the debentures and sundry charges, and the balance after these payments amounts to £467. The directors propose to pay off £250 of the preliminary expenses, leaving £250 to be provided hereafter, placing to coast advance reserve account the sum of £133 to provide for doubtful coast advances, carrying forward the balance of £84. The directors regret that the season's operations have been so unfavourable. The profits have been reduced principally by a heavy loss on working the Frotoft group of estates, which amounted to £1,058. The estimated yield of tea for the season was 503,000 lb., but owing to the unfavourable season, the actual yield was 369,994 lb. the shortfall, amounting to 133,006 lb. being 79,466 lb, less than the previous year.—*Grocers' Journal*, July 15.

COONOOR NOTES.

COFFEE seems to be improving under the conditions and preparing for a good *late blossom*. Let us hope that two cwt. per acre will be added by a September blossom. Cultivation has not been much abated, in fact upon this estate it is being vigorously pushed. More power to it. When prices were high some stuff made up of three parts dry pulp and one part broken coffee was sold in the Coonoor market at six annas a measure; now the finest parchment beans can be had for that and broken at annas 2/6. This will stimulate demand among the poorer natives very much. A native can go without food a whole day if he can get coffee ad lib. He can drink a gallon a day of weak coffee made up with jagherry.

THE NILGIRI RAILWAY improves daily and is becoming more and more popular. The one 3rd class carriage is generally quite full and many passengers have to be accommodated in the 2nd class. The 2nd class going into the 1st, one half the 1st class carriage being reserved for first. One engine is burning

PETROLEUM

and can run a train up in 50 minutes from Hill-Grove including a stoppage of 6 minutes at Runnymede, the distance being 6 miles. With this fuel steam can be got up in a few minutes and the engine arrives with her fire almost out, there being thus no waste. The furnace in the oil is carried in a reservoir over the boiler, a jet of steam is admitted into it, which forces the oil into the furnace in the form of a beautiful spray, which ignites into an intense flame from some coal kept burning at the bottom of the furnace box.

A dense smoke issues from the chimney at the start, and this lasts a few seconds after which there is hardly any smoke at all to be seen. It is charming to hear the beat of the pistons as compared with the laborious sound with ordinary fuel. It would be a help to many if

CHEAP CARRIAGE FOR FUEL

be arranged down, during the slack season to Coimbatore. The price at Coonoor is now R4, per ton, at Coimbatore perhaps 7 a ton. This leaves a margin of R3 for railway carriage.—*Nilgiri News*, July 22.

THE ANAMALAI HILLS.

CEYLON MEN OWN HALF THE ESTATES OPENED UP.

(From a Correspondent of the Madras Mail.)

With the rapid extension of tea and coffee cultivation in Southern India, any information throwing light on the tracts of land still available for such enterprise should prove welcome and valuable, especially to those anxious to invest in either undertaking, and who may be on the *qui vive* for latest details on the subject. The districts which hitherto been exploited include Coorg, Mysore, the Nelliampathy Hills, Travancore, Wynaad, the Shevaroys and Pulneys, while more recently the Anamalais, or Elephant Mountains, have been coming into prominence. The first four tracts lie outside the limits of British India, while the other group is situated within the confines of British territory, and of these the least known, though in many respects the most important for planting purposes is the Anamalais. It seems explicable that the Madras Government should have for such a lengthened period pursued the fatuous policy of allowing the magnificent Forest tract on the Anamalais to remain unoccupied while other districts have been developed and the exports from the country materially increased, but until the last seven or eight years, Government to all intents and purposes, passively acquiesced in persistently ignoring the most obvious interests of the planters. As instances, Waste Land Rules were framed, which literally discouraged the enterprise of the European planter, and during the past 40 years the planting industry in Southern India has been severely handicapped by the inadequacy of the Labour Law (Act XIII of 1859) then introduced, and which, so far as its effective working is concerned, practically offered a premium to unscrupulous maistries and coolies to defraud their employers. Fortunately, H E Sir Arthur Havelock, who enjoyed much valuable experience in Ceylon, fully realises the importance of the planting industry. So it came to pass that, nearly three years ago, the Board of Revenue recommended to the Madras Government the leasing of lands on the Anamalai Hills, and the report indicates that by September, 1896, applications had been received from several Madras firms and planters, and from a well-known firm largely interested in Ceylon, and with a still greater stake in Travancore. The applications embraced tracts of forest from 500 to over 12,000 acres in extent, and aggregated 63,500 acres, or somewhere about 100 square miles. The Government disposed of the matter by assigning 1,000 acres apiece to each of the original 15 applicants. These selections have since been demarcated, and include some of the richest land in India, thoroughly suited in every way for growing coffee, tea, pepper, rubber trees, and other products, while ranging from an altitude of 3,500 to 5,500 feet and enjoying a well distributed rain-fall from 100 to 120 inches. The experience of planters who have resided there during the past two years is that the climate is delightful and exhilarating. The plateau commands magnificent scenery, and at 7,000 feet offers unique advantages for the establishment of a sanitarium in this region. Although the Madras Government restricted the first leases to some 15,000 acres, should the properties now being developed prove a success, a further allotment of similar lands, purchaseable at auction, will no doubt be initiated. In fact, several such blocks for 844, 717 and 400 acres, respectively, are already advertised for sale by public auction at the Collector's Office, Coimbatore, on the 2nd October, 1899, when the upset price is fixed at R5 per acre.

The total area of Forest lands on the Anamalais is estimated to cover 80 square miles. As regards terms of leases, these seemed to be framed and on equitable scale, the cultivation tax of R2 per acre being leviable from the 6th year, on one-twentieth of the holding only continuing in progressive increments. And in the interim the balance of the land is taxed at 8 as per acre. One provision remains to be reconsidered

by Government, and refers to the gathering of Forest products by the Hill men, or Kadirs, who, under instructions from the Conservator of Forests, collect cardamoms and wild pepper. Obviously, this system would prove impracticable when similar products came to be cultivated by planters. But as this tribe is believed to number only about 100, Government should be able to provide for them, though some difficulty may be confronted in the matter, as these men prefer an existence on forest produce, such as yams, fruits, &c. With the establishment of a sanitarium, and the immigration of Missionary settlers, it is probable that some of these difficulties may be dissipated.

Under the ægis of the present sympathetic Governor of Madras, a new policy for the development of the resources of the country is being inaugurated, as is already shown by accelerating the completion of the new road, and by the erection of the iron bridge over the main river, while it is said that the Government projects a line of railway from Podanur to Dindigul *via* Pollachy, which would bring the Anamalai region within touch of Madras, Calicut, Colombo and other parts of India. Irrespective of the Waterfall Estate, and the area opened with coffee in 1897, there are already about 1,500 acres planted this year. Approximately half of the 15,000 acres taken up by planters is held by Ceylon men.

THE MICA INDUSTRY IN INDIA.

The attention that has begun to be paid to mica in the island,—one among the many valuable minerals soon to be extensively worked in this island, we may hope, assisted by the proposed Chamber of Mines whose existence was inaugurated the other day—lends peculiar interest to what is going on in India where, too, mica claims more attention than it used to do. Mr. T. H. Holland, a young geologist with an excellent reputation, recently wrote a sketch of the mica industry of India, which has been published in the Annual Report on the work of the Geological Survey for last year. The Report, we learn from a Calcutta contemporary, was the outcome of a tour of inspection, in the course of which Mr. Holland, with two others, examined the mica-bearing areas of Bengal and Madras; and the conclusion arrived at was that the large and profitable industry might be rendered far more remunerative by more scientific exploitation of the fine pegmatite sheets which have been almost untouched hitherto. The system adopted in Bengal, where the field is 12 miles by 60, is described as most wasteful and primitive, the mines being narrow irregular holes, following

"The pegmatite sometimes to a depth well over two hundred feet. The whole of the materials—mica, rubbish, and water—are brought by coolies to the mouth of the hole, which is often very near the summit of a hill, being the point where, on account of better exposure, the pegmatite outcrop was originally discovered. On account of the accumulation of water, all mining operations are suspended during the monsoon season, and at the close of the rains the process of forking a mine occupies several days, and sometimes weeks. In the same way, an hour every morning is spent in bailing out the water accumulated over night." With a single exception, at Bendi, we are told, "there is not a single vertical shaft in the whole mica mining area of Bengal, not a single drive or cross-cut to show that the miners have appreciated the actual disposition of the pegmatite as normal intrusive sheets, and, notwithstanding the favourably shaped natural contours of the ground, not a single adit for the removal of water. Contrary, too, to the explicit regulations on the subject, no plans of the mines have been prepared to show the disposition of the workings."

In the Madras area, the system is only one step in advance of that which obtains in Bengal, being of the open quarry plan. Notwithstanding that "none of the mines have attempted to deal with the pegmatite vein by vertical hauling shafts and drives, after the fashion pursued in all modern methods of mining for minerals occurring in regular veins or sheets," the industry is flourishing. The yearly exports of mica are valued at a million rupees, and we told that there is no reason why, with careful treatment of the abundant material available, India should not continue to hold her place easily as the first mica-producing country in the world—the more so, as it is likely that mica can be found in other districts, and other minerals are generally associated with gneissose rocks in which mica is found. Among the minerals, some new to India, found in Bengal, were arsenic of iron, in lumps weighing in some instances as much as 20 lb.; phosphate and floride of iron, and manganese, in thick masses; and appatite in such abundance that, out of 100 lb. of material collected at a pit's mouth, 76 per cent of phosphate of lime was obtained. In the scarcity of phosphates in India, the find is naturally considered of importance, as the appetite has hitherto been thrown away and the expense of treating it as a by-product will be almost wholly confined to "cooly labour to pick over the waste heaps, royalty and transport." The Madras area is described as less rich than Bengal; and though larger crystals have been found, the ruby tint which has made Bengal famous in the market remains to be found. All this is of as great interest almost to us as to India; and now that the Government is awakening to the importance of the mining industry generally, and is in communication with India about a geologist, we trust that the Geological Survey we have advocated for years will soon be undertaken and disclose new sources of wealth and industry for us. The primitive and wasteful methods described above almost exactly represent the system generally pursued in the gem and plumbago industries; and the recent discovery of asbestos which we recently noted, should induce the Government to give all the help it can, through a Geological Survey, to capitalists to utilise every available mineral which the island affords.

FACILITIES FOR MAKING TEA.

Two circulars have turned up from Northern Districts which deserve some notice. The drawbacks to one division North of Kandy are said to be :—Previous chenaing of lands, and, partly, full exposure to S.-W. monsoons, and possibly no appliances for cool fermentation. The jât is said to be quite up to the average, but mixed in the oldest instances. There is very little virgin soil and much variation from iron-stone and red loamy clays, to clays, quartzes, gravels and gritty cabooks and micaceous talc, plumbago lands. Any estates worn out?—Yes, in two distinct cases, but one is now being worked

up. Would manuring improve the tea and be profitable, in your opinion?—All analogy goes to prove it,—why should tea be an exception? Has the pruning been too severe, or too frequent?—In some cases distinctly so, in others decidedly not: heroic pruning requires as great skill as heroic surgery (and very careful tipping after). Averages of 600, 640, 550 and 500 lb. an acre are ample evidence of the suitableness of the district for tea.

In the case of the other report from farther North, better tea cannot be made "because it is not in the leaf," although the jât is generally good, and the soil particularly so. Manuring could be decidedly beneficial and factories are not yet equal to a big rush in most instances. The neighbourhood has proved itself very suitable for tea: what it lacks in quality, it makes up for, in quantity.

[Buyers were getting better value some months back than ever before in the history of tea. It is rot to talk of wholesale falling-off in quality. There is more care exercised in manufacture universally, but there is less competition for medium teas in markets.]

DR. GEORGE WATT'S COMING TOUR.

COMMERCIAL SECTION OF THE INDIAN MUSEUM.

Dr. George Watt proceeds to Simla at the beginning of next week, and after spending about a fortnight there, starts on a lengthy tour throughout India, in the course of which, he will visit all the commercial centers from Peshawar to Tanjore. The object of the Reporter on Economic Products, the *Englishman* says, is to gather material for exhibiting in the commercial section of the Indian Museum, which it is hoped to throw open to the public by next cold weather. The plan of this exhibition is at once simple and comprehensive, although the work of classification and arrangement is involving an immense amount of labour. Dr. Watt's idea is to give the economic history of every product in a nutshell. Thus, if it is a plant, it is shown by specimen at every stage from the tree to the finished article, while statistics of every kind are given in connection with it, and a map of India placed alongside show at a glance the various parts of the country in which it may be obtained. And all this cyclopædia of information lies within the compass of a small glass case! It is difficult to estimate the usefulness of this department when once the commercial world appreciates the fact that it embraces every one of the manifold industries on which the economic life of the country depends. Nor is the artistic sacrificed to mere utility. For instance, an enterprising firm of ropemakers display their productions in the form of a large arch, surmounted by their name in letters of rope. Again, a kind of dado is formed right round the room—and a big room it is—by polished slabs representing the various timbers grown on the peninsula and among the Himalyas. Altogether, the economic department of the Indian Museum promises, when it is completed, to render notable service in helping forward the development of the resources of India, and reflects the highest credit upon the learning and ingenuity of Dr. Watt.—*Pioneer*, July 27.

RUBBER DISCOVERED IN CUBA.

It is the positive conviction of Major J. Orton Kerbey, who returned lately to the United States from a tour of Cuba, that he found there the true rubber tree of Central America (*Castilloa elastica*) growing native, and that the conditions for its cultivation are more favorable on the island than even in Mexico or Nicaragua. Major Kerbey pursued his investigations further into the interior of Cuba than any recent visitor, from America, at least, has done in recent times, being aided in his search for the rubber tree by orders from the government at Washington which gave him command of the facilities of the United States military establishment on the island. On the southern coast of Cuba, in particular, he personally saw the trees which he has identified as the *Castilloa elastica*, while he was assured by old residents of good standing that such trees were to be found in abundance. Moreover, he was assured that, in former years *goma* (rubber) figured in the exports of Cuban produce, going presumably to Spanish ports. Major Kerbey is writing some results of his discoveries for The India Rubber World, and the information he has to give may be looked for with interest.—*India Rubber World.*

TEA IN AUSTRALIA.

The tea statistics for the port of Melbourne for the week ended Saturday, 15th instant, compares with the previous week and the corresponding week last year as follows:—

	July 16, 1898. Lb.	July 8, 1899. Lb.	July 15, 1899. Lb.
Entered for bond ..	85,797	196,857	819,339
Duty paid, ex-ship ..	28,672	7,638	46,690
Duty paid ex-bond ..	150,432	139,799	133,206
Exportations, ex bond ..	31,174	68,600	97,662
Exportations under drawback	47,796	41,230	23,533

The Custom-house statement of receipts and deliveries at the bonds for the week ended 15th inst., together with the stocks in bond at the close of the week, is as follows:—

	Receipts into Bond.	Deliveries: For Home Consumption.	Deliveries: For Export.	Stocks on July 15.
	Lb.	Lb.	Lb.	Lb.
China ..	760	32,259	40,486	323,939½
India ..	49,166	34,164	15,030	273,519
Ceylon ..	156,995	56,783	42,146	343,101
Total ..	206,921	123,206	97,662	940,559½

At the corresponding date last year bonded stocks consisted of 423,713½lb. China, 323,754lb. Indian, and 327,137lb. Ceylon; total, 1,074,604½lb.—*Melbourne Argus*, July 19.

Collectors.—Noticing the work of Mr. Whitehead, the Bird Collector in the Far East, the *Spectator* says:—

The time must be approaching when there will be no more unknown birds or beasts to discover. Then the explorer will perforce fall back on the less exciting search for new insects, or new plants and flowers. The botanists and florists have still a field before them, and a new orchid is a valuable discovery, and a new dye or fibre plant potential wealth. If the green indigo, reputed to exist in some country in the Far East, were found, its discoverer's fortune would be made; and a real rival to indiarubber, or a substitute for Manila hemp, would enrich a whole community.

BY RAIL IN BRITISH NORTH BORNEO.

(From Our Own Correspondent.)

Bukow, 16th July.

"No country can advance unless it provides and maintains a comfortable means of rapid transport," is, I believe, an accepted axiom in these days of progress. A few words on the means of communication, present and future, of this new country, will perhaps be of interest to your readers. I left Sandakan on the 3rd July in the coasting steamer "Labuan," north about, to Labuan, calling at the ports. These form a special point in the coast line of Borneo and British North Borneo can boast of better and more numerous harbours than can be found in this part of the ocean's boundaries. Calling in at Jambanjon, Kudat, Ambong, Santian, we arrived

AT LABUAN

on the third day. From Kudat onwards, the hill ranges on a fine day form a fine feature in the view. Kudat is a thriving town, in a good agricultural district, which in 1883 brought in a Revenue of $14,000 to the Treasury and this year the estimate is $123,000 to which increase, tobacco, coffee, and Chinese immigration have helped. The soil is good and the records of the old East India Company, who had stations he e about, show that the Kudat district contained 30,000 fighting men. In these days, the word "fighting" would not apply to the peaceful people who now sparsely occupy the ground, but owing to epidemics in the past, to piracy and to war, the population, though now increasing rapidly, was very small in 1881, when this country came into the hands of the British North Borneo Company. The next port,

AMBONG

is in a pretty land-locked bay. It has only lately been opened and is doing a good cattle trade supplying Sandakan and Looloo where there now are 750 American soldiers. The Government charges an export duty of one dollar per head. The cattle cost about fifteen dollars laid down in Sandakan and sell for twenty to the butcher.

From Ambong a bridle path twenty miles long runs up the Tampassuk River and

THE GREAT MOUNTAIN KINABALU

can be ascended from here; but the best route is from Santian, the new port in Sayah Bay. Mr. Little, the Acting Governor of Labuan, who has ascended Kinabalu, tells me the trip can be done for $300. The officer in-charge at Santian, Mr. Haynes, is very kind and would lend his assistance in collecting transport coolies. I believe the ascent has only been made five times. The upper part of the mountain is smooth rock with low vegetation in the sheltered ravines and crevices. The last village is something over 4,000 feet up and there is a large cave at a 12,000 or about two thousand feet below the top. The cold at night is great and the coolies suffer from want of suitable clothing. To a naturalist the mountain affords a grand field for research.

Labuan is the departure point for the mainland. At present there is only one launch available for the crossing to Weston, the sea terminus of the railway, but I hear rumours that the Sabah Steamship Co., which runs the three local coasting boats, propose to keep a fast launch at Labuan, capable of doing the trip in three hours or less. The present available launch takes five hours and is in a chronic state of breakdown. The line from Weston (so named after Mr. A. J. West, the Railway Engineer) to Bukow, eight miles, is almost complete. I came the whole distance in a truck drawn by the construction engine without a jolt in less than an hour which included two stoppages and taking in firewood and water. At Bukow river, the want of suitable timber has caused delay in building a bridge, but when this has been done the twenty three miles

FROM WESTON TO BEAUFORT JUNCTION

on the Padas River will easily be done in an hour or so. I am now staying the night with Mr. West, the Engineer-in-charge of the construction, and tomorrow we go to Beaufort. in a comfortable first-class carriage. Mr. West has shewn me the train consisting of a light-engine appropriately named "Progress," one first-class car, one third-class and four waggons (one closed) all built of local wood in Mr. West's workshop. This he runs twice a week from Bukow to Beaufort. The third-class car holds thirty and is generally full, (fare twenty-five cents); so are the waggons when going up. Coming down they get a return cargo of rotan, etc., and a little gutta.

The land from Weston to Bukow is

SPLENDID COCONUTS AND RUBBER LAND

and there are a lot of native gardens and paddy fields. The railway overseer at Weston, who lives a couple of miles from the terminus, told me the country was very healthy with good drinking water. It is cold at night. At Weston the people get fish every day. I saw two fishing-boats come in and we took some fish up to Bukow. The price at Weston is three cents a catty. Weston is now beginning to wake up. Up till now all the traffic has gone by the River Bukow to and from Bukow, but a railway bridge across the Bukow will make Weston the terminus. No town lots have been sold as yet at Weston as it is desirable to raise the ground first; but the engine will be at Weston immediately and ballast will soon be run down and thrown over the low land from a hill one mile along the line. A stone pier has also to be made. The hill is a mass of ready-made ballast and at present produces a wonderful crop of pineapples. The pigs take a large share and the balance sell for two cents each (three cents to a European!) This is a wonderful fruit country. Durians sell at five cents and can be had in great quantity next month—*and I hope to be here.* I remember meeting an ex-Ceylon Engineer in Singapore who told me:—"When I scent a durian my mouth waters and I gaze around with fingers itching *to clutch* that durian!" The fall of the year is our chief fruit season.

Tomorrow I go to Beaufort and up the River Padas with Mr. W. Towers who has laid out a railway from Beaufort north along the Coast to Santian, 63 miles, on a metre gauge like this one. Mr. Towers is now inspecting the ground between Beaufort up river thirty (?) miles which he says resembles the Haputale line in point of difficulties. Mr. Towers was seven years in Ceylon and must be well-known to you. I will send you a line on my experiences on my return to the Coast.

NEW CEYLON.

A SAMPLE PACKET OF MALACCA TEA has been sent to the editor of the *Straits Times* who has tried it, and who writes:—"It seems very good tea of a distinct and wholesome flavour, and pure; and one is not surprised to learn that large quantities of it are now being sold in the Straits. The Malacca tea is also being shipped to Egypt and to London, so much so that a new drying machine will shortly be added to the factory."

THE "CAUCHO" RUBBER OF PERU.

A despatch received at the Foreign Office from H. M. Consul at Para states that the tree which produces the quality of india-rubber exported from Peru through Para under the name of *caucho*, has recently been determined by M. Huber, a botanist, who is on the scientific staff of the Museum of Para. M. Huber lately visited the Ucayli region in Peru, and discovered that the tree was a *castilloa*, and he will shortly be able to decide by comparison whether it is the same as the *castilloa elastica* of Central America, or a variety of the same genus. It has been surmised previously that the tree might be a *castilloa*, but it is said that M. Huber is the first authority who has settled the point. With this knowledge it results that the distribution of the *castilloa* is wider than was previously thought to be the case. *Caucho* is also produced in the neighbourhood of the Bolivian tributaries of the River Amazon, and from parts near the said tributaries that pass through Brazilian territory. A sample of *caucho* exists in the Para Museum that came from the banks of the River Tocantins. It is said that *caucho* is also produced near Macapo and Mazagao, on the north bank of the river Amazon, near its estuary. A recent statistical return on the exports of the State of Para shows that this produce was exported in small quantities (altogether about 10 tons) from Aveiros (River Tapajos), Santarem, Alemquer and Obidos, on the River Amazon.

The total shipments of *caucho* from Amazonian ports amount to about 2,000 tons annually. M. Huber describes the process of tapping of follows:—The trunk is almost severed in two at a distance of about 3 ft. from the ground, and the tree is allowed to fall in such a manner that is supported in the inclined position by its branches, and still holds on to the part that remains standing. The Sap is collected and poured into a hole made in the ground, and is coagulated by means of the juice of certain local *lianas*. The natives state that this is the best method of tapping, and if the trees were treated in the same manner as the *heveas* they would soon be destroyed by insects which would attack them where the back would be injured by incision. This may be only an excuse for unnecessary destruction, which might be avoided. However, it must be considered that as these trees grow far apart from each other in their native state it must be inconvenient, if not impossible, to attend to more than one tree at a time. Trees that have been tapped in the manner described do not survive the operation. In the course of time their places are no doubt taken by young trees that grow from seeds. The Amazonian *castilloas* are found on elevated land which is beyond the reach of floods, whereas the *heveas* thrive best in the lowland that are periodically inundated by the River Amazon. Sir W. T. Thistleton Dyer, Director of Kew Gardens, in a communication to the Foreign Office, states that *caucho*, of which caoutchouc is probably an expanded form, has been hitherto indentified with "India-Rubber" par excellence, the produce of one or more species of *hevea* indigenous to the basin of the Amazons and exported from Para; it would now however, appear that the *caucho* tree of Peru is a *castilloa*. One or more species of this genus produces the india-rubber of Central America. In South America the *castilloa* has been known to extend as far as Ecuador, where it is called *jebe* otherwise *jeve* or *heve*. According to Aublet, this latter name was given in Northern Ecuador to a species of *hevea* and in founding that genus he derived its name accordingly. In the Amazon basin the name for the species of *hevea* is "Seringa," and in Central America for those of *castilloa* "Ule" or "Tunu" (see Kew Bulletin, 1898, pp. 141, 142). Perhaps in Western South America the names *caucho* and *jebe* are applied indiscriminately to rubber-producing trees. According to a report by Mr. D. B. Adamson, H.M. Consul at Iquitos, dated 24th December, 1898, and published in the "Transactions" of the Liverpool Geographical Society for the same year, Peru has two kinds of rubber-producing trees—*caucho*, which appears to belong to *castilloa*, and *jebe* or *hevea*. Both Mr. Adamson and Mr. Churchill also state that the rubber is extracted from the *caucho* tree by felling. The *jebe* is always tapped. The former process results in a district being "worked out." In consequence, according to Mr. Adamson, "many of the 'caucheros' (or rubber collectors) are working in Brazilian rivers, where the supply is yet more plentiful." It is not, however, necessary to fell the *castilloa* trees to collect the rubber.—*India-Rubber and Gutta-Percha Trades Journal*, July 10.

ANGLO CEYLON AND GENERAL ESTATES COMPANY, LIMITED.

The ordinary general meeting of the Anglo-Ceylon and general Estates Company, Limited, was held on Tuesday, July 18, at the offices of the company, 20, Eastcheap, London, C.C., Mr. Alex. W Crichton presiding.

The Secretary (Mr. Henry Grey) having read the notice convening the meeting,

The CHAIRMAN said: I am sorry to have to take the chair at this meeting on account of the absence of your chairman, Mr. Quintin Hogg, and I particularly regret that this should be the case on this occasion, because I understand that some of you, at all events, have come here in the expectation, and with the desire, of hearing from him personally some account of his tour in the East, and of the opinions and estimates which he formed there with regard to the affairs of the company. He is, however, unfortunately not able to be present, and I am sure that you will be sorry when you hear that family bereavement is the reason of his non-attendance, and why his presence is absolutely necessary elsewhere. As regards ourselves, this alteration came upon us quite suddenly, and I have no time for the preparation of any statement to lay before the meeting, and, consequently, if in the course of what I am about to say I omit anything, or fail to make anything clear, I hope that you will, by questions, elicit from me that which you want to know. With regard to Ceylon, we state in our report, and I think that you must have had an opportunity of satisfying yourselves repeatedly of the truth of that statement from the number of reports of Ceylon tea companies which have been issued in the course of the last two or three months, that the year under consideration has been a remarkably unfavourable one. Prolonged drought, cold winds, and low temperatures prevented the usual flushing of the tea bushes, and from an estimate which we had of the 1,720,000 lb of tea we only got at the end of the season 1,540,000 lb. This constituted, therefore, a loss of nearly 200,000 lb of our crop. Nor was this the only mishap; for the same causes affected the cocoa crop, which in our case is an important one, and instead of 2,100 cwt. which we received the previous year, we were only able to harvest 274 cwt. This, of course, is an extraordinary diminution, and shows a loss on the working of the cocoa estates. These again, were not the only unfortunate circumstances. In the first part of the year the rice for the coolies had still to be bought at a very high rate, and freights during a great part of the time were also high. On the other hand, there was one point of consolation, and

that you will see reflected in our report, namely, that whereas the general average price of Ceylon tea during the year in London fell from 7·85d, which was the average rate during 1897, to 7·70d, the price which was received for our tea, on the other hand, rose from something over 8d in the previous year to something over 8½d in the year under discussion. This was, of course, something in our favour; but it was not sufficient to counterbalance the disadvantages which I have previously spoken of. On the whole, therefore, there was a very much reduced profit from Ceylon; but I am glad to say that these causes of loss have now, I believe, almost entirely passed away. So far as the reduction of our crop is concerned, they are due, of course, to climatic causes which were merely temporary, and we hear now that the tea is flushing very well, and with regard to the cocoa, the spring crop, which has already been harvested, is a most satisfactory one. The benefit of this, however, did not accrue to the year under consideration, but will be secured by the current year. Mr. Hogg in the course of his tour, visited most of our Ceylon estates, and he has often told me that he was exceedingly satisfied with the work of Mr. Campbell, who appeared to him to be a most excellent manager, and one in whom we could have the fullest confidence, and whose services he considers we are fortunate to possess.

THE POUND DRAFT DISPUTE.

With regard to the sales of tea, you will have read, no doubt, in the papers—and it is hardly possible to avoid knowing—that a dispute has arisen between the growers and importers of Indian and Ceylon tea on the one hand, and the buyers on the other, and the curious part of this dispute appears to be that, whereas the growers assert that they have to give to the buyers, in addition to the 1 lb. draft, at least ½ lb. or more on account of the turn of the scales, the buyers consistently deny they receive much benefit from this. If that is so, where does it go to? I think to those who are conversant with the subject it is pretty clear from its history that they must receive something considerable. Originally, in the old days—that is, in the days of China tea—there was a 1 lb. draft allowed by the importers to the buyers, and, in addition to that, there was a 1 lb. overdraft—that is, altogether, 2 lb. allowed on every chest of tea, and no doubt the importers got that gratis from the Chinese. Well, when the second pound—the overdraft—was discontinued as compensation to the buyers this turn of the scale was allowed to them, and therefore it is clear that it was allowed to them as some substantial benefit which they received. The growers have, of course, had opportunities frequently of going into this matter, and have repeatedly verified their assertions. I well remember, not with reference to this dispute, but on a former occasion, trying to ascertain exactly how the tea was sent off from our factories in Ceylon. I remember very well a garden invoice which was sent here, and in which it appeared that the superintendent had, with regard to one break, placed it in chests, the average weight of which was 16 lb. and 2 oz., and they, of course, were taken, according to the customs weighment, as weighing 17 lb. Now of course, there are only two things imported, the chest and the tea which it contains, and if you have by some fictitious method of weighment increased the weight of the chest, inasmuch as the total weight of the chest and the tea together cannot alter, you take from the estimated weight of the tea. Well, now, how did these 41 chests work out? They worked out in this way—that the tea as sent from the estate weighed on an average in each chest 108¼ lb., and although every chest contained 108¼ lb., yet, by the method of Customs weighment, we got paid for only 107 lb. That is a loss of 1¼ lb. in every chest in addition to the 1 lb. draft, that is, a loss of 2¼ lb. Well, now I admit this is somewhat exceptional, but there must be plenty of cases in which that happens every year, and I believe that growers are not far wrong in saying that at least ½ lb., if not a good deal more than that, is given gratis to the buyers in this way. I will not detain you further on this subject, because it has been so amply discussed; but I cannot help thinking that some equitable means may be found of settling this dispute, which must naturally, if prolonged, mean a loss on both sides, because when these trade disputes take place they are generally followed by a reduction in consumption.

MAURITIUS

I will now pass on to the subject of Mauritius, where the price for sugar during the beginning of the campaign was, as we state in our report, disastrously low, and owing to the disorganisation of the market in Bombay—our principal market—from various causes, have sunk lower and lower, and the falling in the price really reminds me of the story of the man who tried how little he could feed his horse on, till when he reduced him to a straw a day the poor animal died. We have known within the last few years R10 as the price per cental for sugar; then it fell to R9 and then to R8, and now, in this year under discussion, it was only slightly over R7 per cental. Most fortunately for us, the crop was an abundant one and, as you will see from the figures, we harvested from our own estate and those in which we are interested no less than 13,000 tons of sugar, as against some 8,000 tons in the previous year. With regard to the sugar which came from our own estates, you will see that although it was very much more abundant, the expenses really increased very little—only by £3,000; that is, from £66,000 to £69,000. Mr. Hogg was also in Mauritius during the crop time and he made various arrangements. In the first place, I believe that he was the first to introduce there a first-run sugar of low grade, which is now called in Mauritius Grey Vesous, and which has the advantage of being prepared much more cheaply than the white sugar we make for Bombay. This somewhat reduced the expense, and as usual in a good year, all the different items of expense were less in proportion. The general result was that we made a profit which was three times that of the previous year, and amounted to some £10,000. But these causes of profit and advantage to our Mauritius estates are not to be compared to that amelioration which we have to some extent secured, and to which we look with the greatest confidence in the future from the legislation of the Indian Government. I think that every grower of cane in India and Mauritius owes a deep debt of gratitude to the Indian Government and to the ministers here who have supported their action in imposing countervailing duties on the bounty-fed sugar which is imported into India. (Applause). You know, and on the last occasion on which I presided over this meeting I explained to you, the extreme injustice of the conditions under which that sugar is imported, and that this bounty-fed sugar has created fluctuations in the market, which have been extremely prejudicial

us. That state of things has, I hope, now finally passed away. At all events, we look forward in the near future to a much greater stability with regard to our Mauritius interests. Now, with regard to the accounts, you will see that the acceptances and accounts payable are less by some £9,000 than they were in the previous year. With regard to Mauritius the item £99,753 for Mauritius Sugar Estates, including land under realisation, has been reduced by £2,000, because is the previous year it stood at £101,000 odd. This we have received on account of the capital due, and, with regard to the interest which is due, that has been fairly met. I think the matter is therefore in a satisfactory state. There is a new item advances to coolies, which was formerly included in the sundry accounts receivable. That item has been stated separately in order to show what those advances were. The Ceylon expenditure is £40,000, as against £39,000 odd in the previous year. You will say it is a curious thing that whereas your crop was less in Ceylon than in the previous year, the expenses have been somewhat greater; but that is not so, because in rupees the expenses were R5,80,000, against R6,01,000 in the previous period. It is the higher rate of exchange which makes the amount appear larger. I think that is all I need say to you, and, in conclusion, you will see from the accounts of our estates in Ceylon that there are now 5,200 acres of tea in bearing and 800 acres of tea not in bearing. When all that comes into bearing we shall have over 6,000 acres of tea, and although some of our estates increase but slowly in productiveness, yet our manager tells us that our crops of tea must eventually largely increase. With regard to Mauritius, I believe the Indian legislation which I have alluded to, in the opinion of all people connected with Mauritius, puts a very different aspect on the sugar industry there, and I consider, therefore, that I may confidently say to you that the outlook for the company this year is an encouraging one. (Applause.) I would say only one word more with regard to dividend: we recommend that a dividend be paid at the rate of four per cent. I now beg to move: "That the directors' report and statement of accounts to March 31, 1899, now submitted, be, and they are hereby, adopted."

Mr. Claude E S Bishop seconded the motion.

In the course of a discussion which ensued, in which Surgeon-Colonel Porter, Mr. Parsons, Mr. Gillingham, and Mr. Nicholson took part, the latter gentleman stated that he had a great deal of experience of Ceylon and Mauritius, and he considered after the year those countries had passed through the directors had managed the company exceedingly well to have been enabled to pay a dividend of 4 per cent. He also considered the shareholders owed a debt of gratitude to Sir James Westland for the steps he had taken in promoting the Indian legislation with regard to the sugar alluded to by the chairman.

On the proposition of Chairman, seconded by Mr. Macaskie, Mr. Quintin Hogg was re-elected a director.

The motion was then put and carried unanimously.

Messrs. Welton, Jones and Co. having been re-appointed auditors, a vote of thanks was given to the chairman and directors, and the proceedings terminated.—*H. & C. Mail*, July 21.

COFFEE IN HAWAII.

The export of coffee from the Hawaiian Inlands amounts to about 3,000 bags early, nearly all of which goes to United States ports. The finest coffee is produced in the Kona district, Hawaii, where the trees are cultivated 2,000 to 2,500 feet above the sea level. The industry is still in the experimental age, having promise of a great future. A personal study on the spot has led Caspar Whitney, a contributor to *Harper's Weekly*, to the opinion that coffee-growing is the industry which is going to settle up the islands especially Hawaii. Coffee lands are to be found on all the islands, but Hawaii is the only one of the group that has land for public settlement.

The principal coffee districts in the island of Hawaii are Kona (48,000 acres), Puna (67,000 acres), and Hilo (195,000 acres); but a comparatively small percentage of this acreage is planted with coffee or suitable to its cultivation. In all three of these districts, and especially in Hilo, the Government is surveying and opening land for settlement as rapidly as possible. And as fast as the land is put on the market it is being taken up; for the Government sells it for from $5 to $10 per acre, while the boom at the town of Hilo—Hawaii—enables speculators to get $50, $60, and even $100 per acre for the same land, while about $30 to $40 per acre must be reckoned on additionally for clearing off the dense jungle and forest.

Careful figuring reckons the cost of caring for a coffee plantation at from $150 to $200 per acre for five years. There is a comparatively small quantity of land for outright sale—nearly all the desirable land on all the islands is owned or held under long leases, some of them so long as thirty years, which is the limit of life of the coffee tree under cultivation. On Maui, Kauai, and some little on Oahu, coffee has been planted, and prospects reported "flattering," but only on Hawaii have there as yet been results tangible enough for some estimate of profits. Fortunately, on none of the islands has any species of blight made its appearance. Taking a fair average of success at this stage of the industry, a conservative estimate on the commencement of the fifth year places the profit at 15 to 20 per cent on the original investment. The Waianai plant (Oahu) paid for itself in six years, and last year produced sixteen tons of coffee besides.

Furthermore, coffee planters purpose setting out bananas on their coffee fields, thus making the soil do double service without injury to either crop, and yield double profit to the grower. Half a ton of coffee and 300 branches of bananas per acre, as confidently expected from good average soil, are not a bad return by any means. The coffee boom is on the island of Hawaii, and so fast as the Government opens new roads into the coffee belts and plots public land for settlement, just so fast is it being taken up.—*American Grocer*, July 12.

THE MORAWAK KORALE TEA-PEST.—The tea-pest on Silvakanda Estate, Morawak Korale, has, we are glad to learn from Messrs. Boustead Bros., been at length cleared, but 25 acres have suffered and, through the severity of the treatment meted out to them with the pruning-knife, been thrown back for several months. It is hoped that it has been entirely got rid of, but there is no certainty as to the whereabouts of the *larvae* of the pest. No doubt a strict watch will be kept not only in the Morawak Korale, but in several other planting districts, where rumours of pests and gray blight (the latter most especially) are in the troubled air. We trust that the present mining craze will not lead to the neglect of tea plantations for pursuits less safe, and to the consequent spread of the enemies of tea through insufficient vigilance at the outset

Ceylon Rainfall.

S. G. O. METEOROLOGICAL OBSERVATIONS FOR MARCH, 1899.

We append the total fall of rain from which it will be seen that the highest fall was at Gammuduwa Estate, Rattota 12·38 inches, and the lowest at Kotta Estate, Pallai 0·03 inches.

Colombo (40) 0·88
Ratnapura (84) 5.80
Puttalam (27) 3·66
Anuradhapura (295) 0.35
Mannar (12) 0.80
Jaffna .. "
Trincomalee (12) 2·09
Batticaloa (26) 6·75
Hambantota (50) 0·81
Galle (48) 3·25
Kandy (1,654) 3·28
Nuwara Eliya (6,188) 3·75
Hakgala, Nuwara Eliya (5,581) 5·05
Badulla (2,225) 5·84
Vavuniya (317) Observations cancelled
Kurunegala (381) 2·39
Maligakanda, Colombo Mr. Johnson (70) 1·01
Agricultural School Colombo, Mr. Rodrigo 2·01
Wilhelmina Puttalam, Mr. Ratnayeke (131) 3·59
Horakele Estate, Chilaw, Mr. Beven (50) 4·56
Chilaw Kachcheri Chilaw, Mr. Koch (10) 3·85
Franklands Estate —
Veyangoda, Mr. Beven 4·05
Orange Hill, Ragama Mr. Bury (?0) 1·61
Henaratgoda Gardens, Henaratgoda, Mr. de Silva (33) 3·14
Kotua Godella, Rambuk'a Mr. Windus (580) 8·86
Eadella or Liberia Estate Polgahawela Mr. Kynaston (4?5) 4·?7
Geekianakanda, Neboda Mr. Corrie (200) —
Polgahakanda, Neboda Mr. Wight (500) 3·73
Labugama, Hanwella. Mr. Samarakone (369) 4·53
Rayigam, Horana, Mr. Hanan, (?0) 3·92
Kanangma, Avissawella Mr. Cooke (200) 9·?6
Dunedin Estate, Avissawella, Mr. Bayley, (400) 9·63
Digalla Avisawella, Mr. Tottenham, (400) 7·69
Pambagama, Avisawella. Mr. Bridgman (600) 9·15
Avisawella Estate Avisawella Mr. Byrde 250 4·18
Yatideriya, Kegalla, Mr. Fairweather — 6·55
Mahawalatenna, Balangoda Mahawalatenna R.M. — 7·41
Agarsland Estate Balangoda Mr. Boyd (2,215) 6·89
Maduwanwala, Rakwana, Maduwanwela R.M. (750) 4·44
Anninkanda. Morawaka, Mr. Woodhouse (1,400) 8·33
Panilkanda, Morawaka, Mr. James (2,000) 8·80
St. John Del Rey, Bogawantalawa Mr. Glanville (4,300) 5·71
Friedland, Bogawantalawa Mr. Rammell (5,20?) 4·48
Campion, Bogawantalawa. Mr. Saunders (4,840) 4·90
BlairAthol, Dikoya, Mr. Lane (3,641) 5·69
Annfield, Dikoya, Mr. Knight (4,300) 4.89
Maskeliya Hospital, Maskeliya Mr. Oorloff (4,200) 5·03
Hope Estate, Hewaheta, Mr. Bagot (5,?00) 5·91
Coleshream Estate, Watawala Mr. Jones (3,800) 4·?1
Holmwood Est., Agrapatana, Mr. Bosanquet (5,249) 6·97
Sandringham, Agrapatana Mr. Orchard (5,200) 7·52
Gingran-oya, Kotmale, Mr. Cox (3,800) 5·6?
Labookelle, Ramboda, Mr. Stone (5,000) 7·28
Dunsinane, Pundalu-oya, Mr. Metcalfe 4,800 4·90
Sogama, Pusselawa, Mr. Eustace (3,500) 8·31
Kurundu-oya, Maturata, Mr. Owen (5,150) 8·28
Kabaragalla, Maturata, Mr. Maclean (4,200) 5·6?
Maragalla Estate, Moopana, Mr. Betts, (2,200) 5·?3
Moopana, Hospital, Moopana (Mr. Thomasz) (500) 2·27
Madulsima Hospital Lunugala Dr. Vethecan (2,400) 4·86
Meeriabedda, Haputale, Mr. Dupuis (3,600) 9·97
Udahena Estate, Haputale, Mr. Coombe (4,500) 6·8?
Post Office, Bandarawela, Mr. Rodrigo (4,036) 3·35
Callander, Ohiya Mr. Green (5,125) 8·94
Mariawatte, Gampola Mr. Salmond (1,600) 2·15
Orwell Estate, Gampola Mr. Taylor (1,800) 3·83
New Forest, Deltota, Mr. Wardrop (3,500) 7·12
Rajawella, Estate, Teldeniya Mr. Murray (1,500) 3·19
Lower Spring Valley, Badulla Mr. Rettie (3,650) 6·34
Gourakele Estate, Badulla Mr. Hope (1,200) 5·11
Monsagala Estate, Badulla Mr. Deaker (4,500) 8·44
Ledgerwatte, Badulla Mr. Rettie (4,000) 8·91
Dea Ella Estate, M'wa'atenna Mr. Vandersloot (80?) 7·10
Sembawatte Estate, N'pitiya Mr. Roe (1,600) 8·10
Gammaduwa, Estate, Rattota Mr. Westland (2,4?0) *12·38*
Kobonella Estate, Rangala, Mr. Pole (3,300) 8·00
St. Martins, Rangala, Mr. Wyllie (3,60?) 6·39
Crystal Hill, Matale, Mr. Van S'rex (1,400) 7·66
Vicarton Estate, Matale Mr. Carrie (3,250) 9·65
Matale Mr. Tisseverasinghe (1,208) 5·22
Wariapolla, Matale, Mr. Dickenson (1,200) 4·01
Damtu la, M. Sinnetamby (400) 5·78
Kotta Estate, Pallai, Mr. Todd (13) *0.03*
Mantota Hospital, Mannar, Mr. Rosario (17) 2·26
Buttala Hospital, Buttala, Mr. Bulner — 9·35
Police Station, Hatton Police Constable Miskin (4,141) 5·76
Medway Estate Nilaveli, Mr. Abraham, ... 1·50
Delwita, Kurunegala, Mr. Neame (49?) 6·08
Woodside, Uragalla Mr. MacMahon (3,000) 6·58
Gillardstown, Wattegama Mr. Hardy (2,500) 5·43

Ceylon Rainfall.

THE P. W. D. METEOROLOGICAL OBSERVATIONS FOR JULY 1899.—We append this Monthly Return of rain from which it will be seen that the highest fall was at Padupola in the Central Province, 21·98 inches, and the lowest at Point Pedro in the Northern Province 0·01 inch.

WESTERN PROVINCE.

Negombo, Mr. Bucknall (6) ... Nil
Kalutara Mr Gregson (56) 1·19
Labugama, Mr. Bond (369) . 4·91
Henaratgoda, Mr. Silva (33) ... 1·02

CENTRAL PROVINCE.

Katugastota, Mr. Morgan (1,500) .. 4·40
New Valley, (Dikoya) Mr. Ward (3,708) .. 16·54
Helboda, (Pussellawa) Not received (3,300) ... —
Yarrow Estate, Mr. Peto (3,400)... 5·?1
Peradeniya Mr. MacMillan (1,540) ... 6·07
Duckwari, Mr. Edwin (3,300) ... 10·78
Caledonia, Mr Goork (4,273) ... 12·52
Pussellawa, Mr. Powell (3,000) .. 7·46
Hakgala, Mr. Nock (5,581) .. 6·80
S. Wanarajah Estate, Mr. Tatham (3,700) ... 19·87
St. Andrew's (Maskeliya,) Not received (4,200)... —
Padupola, Mr. Ward ... (1,635) 21·98
Mylapitiya, Mr. Fletcher (1,7?7) ... 0·70

NORTHERN PROVINCE.

Mullaittivu, Mr. Sanmukam (12) . 0·98
Jaffna Mr MacDonnell (8) Nil
Mankulam, (N. Road) Mr. Sanmukam (167) .. 0·53
Elephant Pass, Mr. Silva (7) .. Nil
Vangalachettykulam, Mr. Oorloff (179) .. 0·20
Point Pedro, Mr. Pararachasinghe (24) .. 0·01
Jaffna College, Mr. Cooke (9) ... Nil
Kayts, Mr. Kretser (8) .. Nil
Kankesanturai, Mr. Adams (10) . Nil
Pallai, Mr. Silva (24) .. Nil
Murikandy, (North-Central Road) Mr. Silva — 0·70
Nedunkeni, Mr. Sanmukam (122) ... 2·53
Chavakachcheri, Mr. Silva (16) ... Nil
Udupiddi, Mr. Hastings (55) ... Nil
Marichchukaddi, (14) Mr. Thamotharampillay Nil
Murungan, Mr. Bechingberg (52) Nil
Vavuniya Mr. Sanmukam (318) Nil

SOUTHERN PROVINCE.

Ella Vella (262) Mr. Smith 6·39
Kekanadura, (150) do 5·70
Denagama, (286) do 5·53
Uduikiriwila Mr. Lourensz (235) ... 2·55
Kirama, Mr. Ismail (260) 0·10
Hali-ela (200) Mr. Smith 5·40
Tissamaharama, Not received (75) ... —
Matara (15) Mr. Smith 5·3?
Dandeniya, (157) do 5·04
Urubokka, (890) do 4·62
Elagala, Not received (121) —
Tangalla, (94) Mr. Barilet ... 0·53
Mamadola, Mr. Cade (56) ... 1·18

EASTERN PROVINCE.

Irrakkamam, (42) Not received —
Devilana, Mr. Vanderstraaten (136) 3·13
Sagamata, Not received (40) ... —
Ambare, do (65) —
Kanthalai, Mr. Carte (150) 0·31
Allai, Mr. Carte (95) Nil
Rukam, Mr. Vanderstraaten (120) .. Nil
Periyakulam, Mr. Carte (20) ... 0.59
Chadaiyantalawa, Mr. Edge (57) ... Nil
Kalmunai, do (12) Nil
Rotewewa, do (30) Nil
Lahugala, do (70) 0·20
Naulla, do (30) Nil
Andankulam, Mr. Carte (41) ... 0·22
Manalpiddy, Mr. Vanderstraaten (21) 1·50
Maha-Oya-Tank Mr. Vanderstraaten (190) 0·51

N.-W. PROVINCE.

Magalawewa, Mr. Gunaratna (176) ... 0·35
Maha Uswewa tank, Mr. Crabb (160) ... 0·19
Tenepitiya Mr. Churchill (8) ... 0·30
Batalagoda, Mr. Fonseka — 2·67

N.-C. PROVINCE.

Kalawewa, (268) Mr. Carson 0·5?
Maradankadawala, Mr. Carson (443) ... 1·77
Mihintale, Mr MacBride (354) ... 1·14
Horowapotana, Mr. MacBride (217) ... 2·05
Madawachchiya, Mr. MacBride (285) ... Nil
Topare, (200) Not received —
Minneriya — Mr. Eves 0·10

UVA PROVINCE.

Bandarawela, Mr. Tocke (4,389) ... 0·18
Haldummulla, Mr. Viramuttu (3,160) ... Nil
Kumbukan, (446) Mr. Emerson ... 3·12
Koslanda, (2,258) Mr. Emerson ... 0·75
Tanamalwila, Not received (550) ... —

SABARAGAMUWA.

Ambanpitiya, Mr. Caldicott (729) 4·28
Pelmadulla, Mr. Clarke (408) 13·84
Kolonna Korale (Hulanda-oya) (203) Not received —
Avisawella, Mr. Jeffery (105) 6·07

SHARE LIST.

ISSUED BY THE

COLOMBO SHARE BROKERS' ASSOCIATION.

CEYLON PRODUCE COMPANIES.

Name of Company.	Amount paid per share.	Buyers.	Sellers
Agra Ouvah Estates Co., Ltd.	500	—	925
Ceylon Tea and Coconut Estates	500	—	500 n'l
Castlereagh Tea Co., Ltd.	100	—	95
Ceylon Hills Estates Co., Ltd.	100	—	30
Ceylon Provincial Estates Co.	500	485	—
Claremont Estates Co., Ltd.	100	15	..
Clunes Tea Co., Ltd.	100	—	105·50
Clyde Estates Co., Ltd.	100	—	90
Delgolla Estates Co., Ltd.	400	—	150
Doomoo Tea Co., of Ceylon, Ltd.	100	—	65*
Drayton Estate Co., Ltd.	100	—	135
Ella Tea Co., of Ceylon, Ltd.	100	60	65
Estates Co., of Uva, Ltd.	500	—	350
Gangawatta	500	—	—
Glasgow Estate Co., Ltd.	500	—	975
Great Western Tea Co., of Ceylon, Ltd.	500	645	—
Hapugahalande Tea Estate Co Ltd	200	—	250
High Forests Estates Co Ltd	500	—	550* xd
Do part paid	350	...	350*
Horekelly Estates Co., Ltd.	100	—	85
Kalutara Co., Ltd.	500	—	390* xd
Kandyan Hills Co Ltd.	100	45	—
Kanapediwatte Ltd.	100	—	85*
Kelani Tea Garden Co., Ltd.	100	...	65
Kirklees Estates Co., Ltd.	100	—	142·50
Knavesmire Estates Co., Ltd.	100	..	75
Maha Uva Estates Co., Ltd	500	—	575
Mocha Tea Co., of Ceylon, Ltd.	500	—	675
Nahavilla Estate Co., Ltd.	500	—	500
Nyassaland Coffee Co. Ltd.	100	..	90
Ottery Estate Co., Ltd.	100	110	—
Palmerston Tea Co., Ltd.	500	..	415
Penrhos Estates Co., Ltd.	100	—	105
Pine Hill Estate Co., Ltd.	60	—	50
Pitakanda Tea Company	500	1,000	—
Putupaula Tea Co., Ltd.	100	..	100
Ratwatte Cocoa Co., Ltd.	500	350	500 n'l
Rayigam Tea Co., Ltd.	100	—	57·50*
Roeberry Tea Co., Ltd.	100	—	50*
Ruanwella Tea Co., Ltd.	100	...	75
St. Heliers Tea Co., Ltd.	5 0	505	—
Talgaswela Tea Co., Ltd.	100	—	35
Do 7 per cent. Prefs.	100	80	..
Tonacombe Estate Co., Ltd.	500	—	450
Udabage Estate Co., Ltd.	100	..	65
Udugama Tea & Timber Co., Ltd.	50	..	10 n l
Union Estate Co., Ltd.	500	—	300
Upper Maskeliya Estate Co., Ltd.	500	..	500
Uvakellie Tea Co., of Ceylon, Ltd.	100	65	..
Vogan Tea Co., Ltd.	100	—	85
Wanarajah Tea Co., Ltd.	500	—	1145
Yataderiya Tea Co., Ltd.	100	..	400

CEYLON COMMERCIAL COMPANIES

Name of Company.	Amount paid per share.	Buyers.	Sellers
Adam's Peak Hotel Co., Ltd.	100	..	60
Bristol Hotel Co., Ltd.	100	85	—
Do 7 per cent Debts.	100	102·50	—
Ceylon Gen. Steam Navgt. Co., Ltd.	100	205	—
Colombo Apothecaries Co., Ltd	100	135*	...
Colombo Assembly Rooms Co., Ltd.	20	..	12·50
Do prefs.	20	..	17
Colombo Fort Land and Building Co., Ltd.	100	..	80
Colombo Hotels Company	100	—	300
Galle Face Hotel Co., Ltd.	100	..	150*
Kandy Hotels Co., Ltd.	100	—	90
Kandy Stations Hotels Co.	100	..	40
Mount Lavinia Hotels Co., Ltd.	500	—	400
New Colombo Ice Co., Ltd.	100	—	170
Nuwara Eliya Hotels Co., Ltd.	100	—	40
Public Hall Co., Ltd.	20	15	—
Petroleum Storage Co.	100	—	—
Do 10 % prefs.	100	35	40

* Transactions.

LONDON COMPANIES.

Name of Company.	Amount paid per share.	Buyers.	Sellers.
Alliance Tea Co., of Ceylon, Ltd.	10	8½—9	—
Associated Estates Co., of Ceylon Ltd.	10	..	6¾—7
Do. 6 per cent prefs.	10	..	9—10
Ceylon Proprietary Co.	1	..	12·6—17·6
Ceylon Tea Plantation Co., Ltd.	10	..	26½—27
Dimbula Valley Co., Ltd.	5	—	5¾—6
Do prefs.	5	—	5½—6
Eastern Produce and Estates Co., Ltd.	5	..	6—6½
Ederapolla Tea Co., Ltd.	10	.	8—9
Imperial Tea Estates Ltd	10	..	6—7
Kelani Valley Tea Asson., Ltd.	5	..	5—6
Kintyre Estates Co , Ltd.	10	.	7*
Lanka Plantation Co., Ltd.	10	4½	5—6
Nahalma Estates Co., Ltd.	1	.	½—1
New Dimbula Co., Ltd.	1	..	2½—3
Nuwara Eliya Tea Est. Co., Ltd	10	..	10½
Ouvah Coffee Co.,Ltd.	10	7	8
Ragalla Tea Estates Co., Ltd.	10	...	10½
Scottish Ceylon Tea Co., Ltd.	10	..	14—16
Spring Valley Tea Co., Ltd	10	..	5—6 n'l
Standard Tea Co., Ltd	10	..	12—13
Yatiyantota Ceylon Tea Co., Ltd	10	...	8—9
Yatiyantota pref. 6 o/o	10	..	10—10¼

BY ORDER OF THE COMMITTEE.

Colombo, 1st September, 1899.

RAINFALL RETURN FOR COLOMBO

(Supplied by the Surveyor-General.)

	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897	1898	Av. of 29yrs.	1899
	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch	Inch	Inch	Inch.	Inch.
January ..	0·81	1·45	7·39	5·42	0·62	5·00	2·92	3·81	2·32	3·09	6·98
February ..	4·36	2·81	5·32	2·36	0·52	0·81	0·35	1·68	1·98	1·90	2·78
March ..	5·34	9·43	1·52	5·15	7·44	1·84	5·64	3·66	4·21	4·92	0·88
April ..	14·27	5.93	13·92	20·39	12·51	9·34	5·93	10·97	22·81	11·47	6·66
May ..	6·48	17·65	3·00	10·32	3·00	10·09	9·31	8·30	5·80	11·89	17·73
June ..	1·87	9.79	6·62	11·01	11·32	13·99	8·37	10·14	10·94	8·34	9·23
July ..	3·32	4·59	1·10	2·20	1·72	0·52	2·85	5·24	6·15	4·49	1·11
August ..	0·73	1·65	1·86	1·01	0·86	0·92	6·35	9·09	0·97	3·77	0·62*
September	1·50	4·42	1·14	1 99	0·78	4·09	10·99	4·58	6·90	5·13	
October ..	13·33	35·28	12·24	5·59	20·81	30·36	16·78	4·71	20·60	14·57	
November..	12·32	18·37	5·86	18·10	14·63	5·83	19.81	11·66	17·38	12·80	
December..	8·47	7·66	0·86	·13	3·25	9·44	11·76	8·89	3 (5	6·45	
Total..	72·80	119·03	60·83	89·67	77·46	92·23	101·06	82·7	103·11	88·82	45·98

* From 1st to 30th Aug. 0·62 inch, that is up to 9 30 a.m. 31st Aug.—ED. *C.O.*

THE CHINESE TEA TRADE.—Consular reports do not offer encouragement to those who are looking for the rehabilitation of the tea trade of China. From Canton Mr. Consul R. W. Mansfield reports that the decaying tea trade again diminished by over 500,000 lb. A dry spring and an insurrection in June in close proximity to the tea districts may to some extent have affected the trade, but the real reason for the decline is the steady falling off in the demand for Canton scented capers on the London market. "What demand there is more and more for low-priced teas for blending purposes, and a few more years will probably see even this small demand disappear. The quality of the teas was fully up to the average standard, and they were exceptionally well scented,

COLOMBO PRICE CURRENT.

(Furnished by the Chamber of Commerce.)

Colombo 29th Aug, 1899

EXCHANGE ON LONDON:—Closing Rates: *Bank Selling Rates*:—On demand 1/4; 4 months' sight 1/4 1-32; 6 months' sight 1/4 1-16.

Bank Buying Rates:—Credits 3 months' sight 1/4 7-32 to 1/4¼; 6 months' sight 1/4 11-32 to ⅜; Docts 3months' sight 1/4 9-32 to 5-16; 6 months' sight 1/4 13 32 to 7-16.

Indian Bank Minimum Rates 4 o/o

Local Rates: 2 o/o Higher.

COFFEE:—

Plantation Estate Parchment on the spot per bus—R12.50

Plantation Estate Coffee, f.o.b on the spot per cwt R72·50.

Liberian Parchment on the spot per bns—None.

Native Coffee f.o.b per cwt. R38.00 Scarce and nominal.

TEA:—Average Prices ruling during the week—Broken Pekoe per lb. 42c. Pekoe per lb. 36c. Pekoe Souchong per lb. 30c. Broken Mixed and Dust per lb. 24c.—Averages of Week's sale.

CINCHONA BARK:—Per unit of Sulphate of Quinine per lb 8c. 1 % 4 o/o

CARDAMOMS:—Per lb R1.82

COCONUT OIL:—Mill oil per cwt. None.

Dealers' oil per cwt. R13.75; Coconut oil in ordinary packages f.o.b. per ton R310.00

COPRA:—Per candy of 560 lb. R42.50

COCONUT CAKE:—(Poonac) f o.b. per ton, R85.00

Cocoa unpicked & undried, per cwt. R37.00 Supplies scarce—out of season.

Picked & Dried f. o. b. per cwt. R48.00

COIR YARN.—Nos. 1 to 8 { Kogalla R17.25 / Colombo R16.00 }

CINNAMON:—Nos. 1 & 2 only f.o.b. 64c. No transactions since London sales showing slight advance in price.

Do Ordinary Assortment. per lb 55c.

EBONY.—Per ton None.

PLUMBAGO:—Large Lumps per ton, R1,200

Ordinary Lumps per ton, R1,150

Chips per ton, R750; Dust per ton, R600; Dust Flying R150—Market Weaker.

RICE.—Soolai per bag, R7.87 to 8.37

„ per bushel, R3 00 to 3.20

Pegu & Calcutta Calunda per bushel. R3.15 to 3.25

Coast Calunda per bushel, R3.25 to R3.50

Mutusamba per bushel R3.44 to 3.75

Kadapa and Karuwe, per bushel } None.
Rangoon, raw 3 bushel bag. }

Soolai Kara per bushel R2.95 to 3 05

Coast Kara per bushel None.

THE LOCAL MARKET.

(By Mr. James Gibson, Baillie St., Fort.)

Colombo, Aug. 29th, 1899.

COFFEE:—

Estate Parchment:—per bushel	} Nil.	
Chetty do do		
Native Coffee } per cwt.		R35·00 to 40·00
do F. O. B }		
Liberian coffee:—per bushel		R3·50
do cleaned coffee:—per cwt		R22·25
Cocoa unpicked:—per cwt		R37·00 to 45·00
do cleaned do		R42·00 to 48·00
Cardamoms Mysore do		R1·65 to 2·00
do Malabar per lb		R1·00 to 1·25
RICE:—		
Soolai per bag of 164 lb. nett		R7·87 to 8·37
Slate or 1st quality:—per bushel		R3·15 to 3·20
Soolai 2 & 3rd. do do do		R3·00 to 3·15
Coast Calunda		R3·25 to 3·50
Coast Kara		R3·00 to 3·10
Kazala		R2·95 to 3·00
Muttusamba Ordinary		R3·44 to 3·75
Cinnamon. per lb No 1 to 4		R00 55½
do do 1 to 2		R00·64
do Chips per candy		R92 50
Coconuts Ordinary per thousand		R35·50 to 38·00
do Selected do		R36·00 to 39·00
Coconut Oil per cwt		R13·50 to 13·75
do do F. O. B. per ton		R270·00 to 275·00
POONAC:—		
Gingelly per ton		92·50 to 95·00
Coconut Chekku do		R77·50 to 80·00
do Mill (retail) do		R75·00 to 80·00
POONAC:—		
Cotton Seed do		R65·00
Copra per candy		
Kalpitiya do		R42·50
Marawila do		R41·00 to 41·25
Cart Copra do		R40·00
Satinwood per cubic feet		R2·00 to 2·25
do Flowered do		R5·00 to 6·00
Halmilla do		R1·90
Palu do		R1·00 to 1·12
Ebony per ton		R75·00 to 175·00
Kitul fibre per cwt		R30·00
Palmyra do do		R8·50 to 17·50
Jaffna Black Clean per cwt		R14·00
do mixed do		R11·00 to 13·00
Indian do		R8·50 to 13·50
do Cleaned do		R11·00 to 17·50
Sapanwood per ton		R50·00 to 52·50
Kerosine oil American per case		R6·00 to 6·25
do bulk Russian per tin		R2·50 to 2·75
do Russian per case		R5·55 to 5·75
Nux Vomica per cwt		R2·00 to 3·50
Croton Seed per cwt		R38·00 to 40·00
Kapok cleaned f o b do cwt		R24·00 to 25·00
do uncleaned do		R7·50 to 8·00
Plumbago per ton, according to grade	Large lumps	R700·00 to 1,200·00
	do	R550·00 to 1,150·00
	Chips	R300·00 to 750·00
	Dust	R150·00 to 600·00

CEYLON EXPORTS AND DISTRIBUTION. 1899.

COUNTRIES.	Tea, 1899 lbs.	Tea, 1898 lbs.	Coffee - cwt. Plantation	Coffee - cwt. N'tive	Coffee - cwt. Total.	Cinchona Branch & Trunk lb. 1899. lbs.	Cinchona Branch & Trunk lb. 1898. lbs.	Cocoa cwts.	C'moms lbs.	Cinnamon. Bales lbs.	Cinnamon. Chips. lbs.	Coconut Oil. 1899 cwts.	Coconut Oil. 1898 cwts.
To U. K. ..	66280808	66094112	10634	..	10634	380195	456492	31426	243055	437596	496274	74431	66761
„ Austria ..	7338	12333	1	..	1	..	..	...	...	..	105966	2064	6490
„ Belgium ...	9983	8540	90	..	90	..	4421	157	58	47260	95760	1006	903
„ France ..	69707	59439	165	...	165	33	21808	34	...	65954	1750	..	4209
„ Germany ..	259907	214880	19	..	19	..	..	..	20490	282139	353488	1412	6978
„ Holland ..	12860	22631	..	..	..	...	..	..	...	..	..	...	..
„ Italy ..	8716	2970	..	..	..	..	..	...	20	58300	111520	404	397
„ Russia ..	2417202	1634385	24	..	24	...	..	...	923		...	..	..
„ Spain ..	11800	24650	..	...	..	..	...	..	...	138400	29400	..	..
„ Sweden ..	35986	25664	..	..	..	..	..	...	4036	500	..	206	..
„ Turkey ..	11007	22542	1	:	1	..	...	..	336	...	..	..	..
„ India ..	354067	799834	71	..	71	..	..	1	37492	..		40069	80916
„ Australia ..	10172223	10081116	2384	..	2384	..	...	95	..	4900	16240	373	422
„ America ..	1967887	1660744	442	..	442	94005	186819	514	6240	100600	28000	69932	38235
„ Africa ..	200618	278186	...	..	..	..	724	..	952	400	1240	...	..
„ China ..	821309	780286	28	...	28	...	2026	...	2388	45000	...	2880	2327
„ Singapore ..	42471	43626	78	..	78	..	--	..	480	..	..	22333	70777
„ Mauritius ..	46179	7300	..	..	..	..	..	..	...	...	..	..	..
„ Malta ..	178652	116229	..	...	...	...	..	..	..	..	..	..	...
Total export from 1st Jan. to 29th Aug. 1899	82905720	81889267	13937	..	13937	474233	672290	32227	316470	1181049	1239638	219110	278415

MARKET RATES FOR OLD AND NEW PRODUCTS.

(From Lewis & Peat s Fortnightly Prices Current, London, August 12th, 1899.)

☞ No Price Current having reached us by latest Mail, we omit the usual quotations and fill with other matter,

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FOREIGN MARKETS FOR TEA.

At the meeting of the United Planters' Association of Southern India on the 16th inst.,

Mr. ACWORTH said:—You are doubtless all aware that, some few years ago, the Indian Tea Association and the Ceylon Planters' Association started a fund to push the consumption of British grown tea on the American Continent. This Fund was called the American Market Fund and its success has justified expectation. It began work in the face of the greatest opposition and the position seemed at first almost a hopeless fight, and yet from a consumption of nothing per annum when they started, the returns last year showed that 12 millions lb. of British grown tea were consumed in the United States of America and Canada; and I have no doubt that the consumption is annually increasing. I am afraid, gentlemen, it is only fair to say that the joint action of the two Associations would have had far greater success had the Indian subscription to the Fund been on the same lines as in Ceylon. In India the subscriptions were voluntary; in Ceylon, by the wish of the planters themselves, it was compulsory. Now there is much to be said for voluntary contributions when all do their duty, but the policy of the Indian governing body did not meet with a very liberal response from the Indian planters, some 40 per cent. holding aloof. We are larger producers than Ceylon, yet the Fund fell short of that raised in Ceylon, by almost half. I am proud to say, however, that my own Association has from the inauguration of the Fund subscribed annually its full quota throughout. I believe I am right in saying we are the only body throughout the length and breadth of India that has done so, and that several of our members are so disgusted with the inaction, apathy and sheer selfishness shown by others that they are inclined to hold aloof. To me it appears that the apathy of India in this matter is more than unfortunate, it is almost disastrous. Messrs. Gow, Wilson and Stanton wrote that the London market had been relieved of 58 million lb. of tea. I tremble to think to what point the market would have dropped if this had not been accomplished by the joint action of the two Associations. Again a prominent member of the Indian Tea Association, speaking at Calcutta in May last, stated that the London market had been relieved of an additional 10 million lb. We would never have seen the slump that did take place, and could have been averted, if India had done its duty. There is no doubt to my mind that we have only just reached a critical state. Production is increasing and competition is increasing. Japan, our shrewdest and most popular rival, is making gigantic efforts to oust us from our present position and improve her own. She has spent already £80,000 in pushing her produce and is prepared to go further. Who can foretell the enormous injury the opening of China and her vast tea districts will do? Thus I believe, gentlemen, the fight for the tea markets of the world has only just begun, and it depends on our own action whether the fight shall be for us one of life or death. The Anglo-Saxon is never beaten when he sets his teeth and determines to fight; but the time has come when he must make that determination. They raise by a levy of a cess of 20 cents per 100 lb. of tea in Ceylon rather over R3 lakhs a year, and by spending this money in judiciously advertising and pushing their produce they are able to relieve the London market and raise the average prices of British grown tea from 8¼d to 8½d per lb. That is to say the producer gets an extra farthing on the lb, of his crop. This sum on the total output of India for the year amounts to 2½ million, omitting Ceylon from the calculation altogether. Will any one tell me the game is not worth the candle? The thing is self evident and requires no argument. The only pity to my mind is that the Indian Tea Association did not some years ago move on the same lines that Ceylon has done (cheers). I therefor beg to move "That the Secretary be instructed to write to the Indian Tea Association and press upon that body the great importance of obtaining funds for the American and Continental Funds and to request it to approach the Supreme Government with the object of securing an acton the same lines as Ceylon Act IV of 1894."

The resolution was seconded by Mr. H M Knight.

Mr. HODGSON said the subject of Mr. Acworth's speech was new to him and he was not prepared to vote for it without first consulting his Association. The principal was fair, no doubt, but the Resolution called upon all planters in South India to consent to a self-imposed taxation, which was a proposition he was not prepared to assent to without consideration.

The Resolution was carried, coffee planters holding aloof and not voting.—*M. Mail*, August 17.

"ALL ABOUT RUBBER."

The third edition of this useful compilation has been issued by Messrs. A. M. & J. Ferguson, of Ceylon. It is revised and enlarged and brought thoroughly up to date, having the latest statistics and information with regard to cultivation, and scientific experiments in Trinidad and Ceylon. The table of contents shows how thoroughly every source of information has been ransacked, and in the 350 pages of the book there is a vast amount of information useful and instructive to the planter of what is believed to be the coming industry.—*S. F. Press*, Aug. 12.

ASBESTOS IN CEYLON.—Supplementing previous information respecting Asbestos in Ceylon, the discovery of which the *Ceylon Observer* was the first to announce, we qoute the following lines (signed J. J. G.) from our evening contemporary:—

On enquiry from one of the largest owners of plumbago mines in the Province, who has an experience of over thirty years' mining in different localities, I learnt that he came across "asbestos" in several of his pits; but he did not take any notice of it beyond looking at it out of curiosity, as he was not aware of its value. Some two or three years ago he came across a pretty large quantity of the "oily stuff"—that is what he calls it—in one of his pits. It was so oily that, if it touched the body of a man while working in water, he says not a drop of water remained on the man's body. Asked as to the nature of the soil in which the "stuff" is usually found, he replied that all the instances he came across in pits on the slopes of hills adjoining fields. It is found at every depth at which plumbago is found, but only in a peculiar kind of soil which is dark-coloured and clayey; and which, when exposed to the sun, turns to a red colour. "Asbestos," so far as he has seen he says, is found in small crevices, about the size of the pockets of a billiard table, between the "illama" rock and plumbago. It is of a whitish colour, weighing one to two pounds, and has the appearance of well-prepared putty. The pits in which he found asbestos were situated in the following villages:—Karayaldeniya, Hali ela and Atanikita—about thirteen miles from Galle, near about Ahangama.

THE

AGRICULTURAL MAGAZINE,

COLOMBO.

Added as a Supplement Monthly to the "TROPICAL AGRICULTURIST."

The following pages include the Contents of the *Agricultural Magazine* for September:—

Vol. XI.] SEPTEMBER, 1899. [No. 3.

BEE-KEEPING.

WE are glad to be able to announce that the experiment in bee-keeping at the School of Agriculture has now had a fair start. A couple of frame hives specially constructed by Mr. Charles Andree of Kurunegalla (whose name is always associated with apiculture in Ceylon) were obtained some time ago, but these remained empty for a while owing to the difficulty experienced in securing a swarm near Colombo. During the late Show, however, Mr. Andree brought over a glass hive for exhibition purposes (and for which he was awarded a special Silver Medal), and kindly left the swarm to start the experiment at the school. The variety of bee chosen is the most satisfactory of the honey bees of Ceylon, known in Sinhalese as the "*me-messa*" (*Apis indica*). The hive as constructed by Mr. Andree, after many years of close attention to the subject, is specially adapted to the requirements of these bees, so that the modern and enlightened process of bee-keeping has been undertaken as it shonld be, not by the wholesale adoption of European appliances, but by a judicious modification of them to suit local conditions. A small bee-house has been constructed on the premises of the School of Agriculture, in which the main swarm has been located. In the original hive may be seen four parallel combs, and as there is a secoud casing of glass within the wood structure, the progress of the work of the bees can be watched from day to day.

It is high time that the barbarous method of collecting honey in vogue among the natives, accompanied as it is by the great loss of bee-life, should give place to the more humane modern method of bee-keeping we are trying to popularise. Honey is admitted on all hands to be one of the most wholesome and palatable foods, particularly for the young, and while it is so largely produced and consumed in other countries, it is a reproach that in this Island where there are such facilities for carrying on apiculture, it should not be possible to purchase pure honey—the stuff offered as such being in most cases an unwholesome compound of filthily-extracted bees' honey and "jaggery" (or palm sugar boiled with water).

We can think of no more suitable occupation for the women and children and older members of a villagers' family than that of bee-keeping on modern lines. Practically the only expense is the cost of the hive which should not exceed three or four rupees, and then bee-keeping makes but a small demand on the time and attention of the keeper. So that for the inactive villager this is the ideal occupation! As an interesting pursuit there is nothing to beat it, while as a means of occupying the mind of the idle, whose thoughts from stagnation become foul and breed crime, the introduction of bee-keeping among the village population is a measure that deserves all the support that the authorities can give it. And who can say but that the industry of the insect may put the lazy man to shame and urge him on to emulation! So may it be.

OCCASIONAL NOTES.

The following is the result of a sale of cattle held at the Government Dairy on the 18th August :—

No.			purchased by	Rs.
1	cow calf		Dr. Rockwood ...	40
2	"	"	Sir Harry Dias ...	55
3	"	"	Mr. R. E. D. Bandaranaike ...	43
4	"	"	Mr. A.A.C. Moraes .	59
5	"	"	Mudaliyar S. R. de Fonseka ...	46
6	"	"	Mr. A. A.C. Moraes.	70
7	"	"	Mudaliyar S. R. de Fonseka ...	55
8	"	"	Mudaliyar Dassenaike ...	51
9	"	"	Dr. Rockwood ...	36
10	"	"	Mr. R. E. D. Bandaranaike ...	55
11	"	"	" ...	63
12	bull calf		Bought in	
13	"	"	Mr. A.A.C. Moraes	110
14	"	"	Dr. Rockwood ...	32
15	"	"	Mudaliyar S. R. de Fonseka ...	80
16	a cow	"	Mr. A.A.C. Moraes	70
17	"	"	Sir Harry Dias ...	48
				Rs 913

The prices obtained are highly satisfactory, the average working out R57 a head, while R110 for a bull calf is quite a record price.

We are now able to supply our readers with an index to the Tenth volume of the Agricultural Magazine.

A meeting of the Commission appointed by H.E. the Governor to consider the advisability of having an Agricultural Department and to submit a report thereon, was held at the Agricultural College yesterday morning, when there were present the Hon. Mr. Justice Lawrie (Chairman), the Hon. Mr. L. F. Lee, the Hon. Mr. A. de A. Seneviratne, the Hon. Mr. J. N. Campbell, Messrs. F. G. A. Lane and Don Solomon Dias Bandaranaike, Maha Mudaliyar. A letter from Mr. J. H. Starey, Nuwara Eliya, was read. Mr. Lee's amendment on the report was placed before the meeting, and after some discussion. The Chairman proposed that Mr. Lee's report be adopted with the amendment, and that it be printed and circulated among the members for any additions they think proper to make. The proposal was agreed to, and the proceedings terminated.

The Colombo Agri-Horticultural Society offered a gold and a silver medal for country-bred horses exhibited at the Horse, Cattle, and Dog Show held in August. Both awards went to the Maha Mudaliyar who is foremost among horse-breeders in the Island.

The local Paris Exhibition Committe has recommended to Government that Mr. W. E. Davidson, who is Vice-Chairman and Secretary General of the Committee, should proceed to Paris as official representative of Ceylon. Mr. Davidson was one of the officials connected with the representation of Ceylon in London at the Indian and Colonial Exhibition of 1886, and we do not think a wiser selection could have been made than has been done by the Paris Exhibition Committee, and the interests of Ceylon should be perfectly safe in the hands of the Commisioner elect:

RAINFALL TAKEN AT THE SCHOOL OF AGRICULTURE DURING THE MONTH OF JULY, 1899.

1	Saturday ..	Nil	17	Monday ...	Nil
2	Sunday ..	Nil	18	Tuesday ..	·25
3	Monday ..	Nil	19	Wednesday	Nil
4	Tuesday ..	·08	20	Thursday ..	Nil
5	Wednesday..	·33	21	Friday ..	Nil
6	Thursday ..	Nil	22	Saturday ..	Nil
7	Friday ..	Nil	23	Sunday ..	Nil
8	Saturday ..	Nil	24	Monday ..	Nil
9	Sunday ..	Nil	25	Tuesday ..	Nil
10	Monday ..	Nil	26	Wednesday	Nil
11	Tuesday ..	Nil	27	Thursday ..	Nil
12	Wednesday...	Nil	28	Friday ..	Nil
13	Thursday ...	Nil	29	Saturday ...	Nil
14	Friday ...	Nil	30	Sunday ...	Nil
15	Saturday ...	Nil	31	Monday ...	Nil
16	Sunday ..	Nil	1	Tuesday ..	Nil
				Total...	·66

Greatest amount of rainfall in any 24 hours on the 5th inst., ·33 inches.

Mean rainfall for the month ·02 in.

Recorded by Mr. J. A. G. RODRIGO.

VETERINARY ITEMS.

It is high time that some organization was brought about in the Veterinary Department of Ceylon which at present consists of the Colonial Veterinary Surgeon and an assistant. It is of course impossible for these two officers to make any impression on the stock diseases and especially the contagious diseases of the Colony. Not even when rinderpest rages in a dozen different centres has it been thought practicable to increase the veterinary staff in such an emergency. And while Koch's method of inoculation is being adopted under Government auspices wherever rinderpest occurs, it no decided official recognition of this new discovery appears to have been given to it in Ceylon.

The following is the Government Resolution on the Report by the Imperial Bacteriologist on the results of the inoculation against the disease in the Bareilly district :—

In the Resolution of the Department of Revenue and Agriculture, No. 8-94-8, dated the 5th May, 1898, on the subject of the demonstrations made by Dr. Koch at Mukhtesar of his methods of immunizing cattle against rinderpest, the Government of India asked for the hearty co-operation of Local Governments and Administrations in the carrying out of experiments in different parts of the country, more especially in th districts in the plains. The opportunity ha recently occurred of making such experiments i

Bareilly; and as the results, though the experiments were on a small scale, were satisfactory, the Lieutenant-Governor considers it advisable that the procedure adopted should be made generally known. On receipt of information regarding outbroaks of rinderpest in the Bareilly district, Captain Rogers, I.M.S., the Imperial Bacteriologist, in March last, addressed the Collector of the district, stating that he would shortly have a supply of serum for use in inoculation, and asking for assistance in carrying out the process. The Commissioner of Rohilkhand submitted the correspondence to Government for definite orders as to the nature and extent of the assistance to be given, pointing out that any mistake at the beginning might have serious effects. The Commissioner was informed by the Government that the Bacteriologist should receive all possible assistance in the prosecution of his work in Bareilly, the results of which might be of the greatest benefit to the country; but that care should be taken that no pressure was brought to bear on the villagers, and that no experiments were made without their full consent. To secure these ends the following procedure was prescribed. On hearing of an outbreak in a village conveniently situated for the Bacteriologist's action, a sensible and trustworthy Deputy Collector or Tahsildar was to be deputed to go at once to the spot, assemble the landlords and chief raiyats, explain to them the object of inoculation, and strive to get their consent to its being tried. On their consenting, but not otherwise, the Bacteriologist was to be allowed to inoculate the cattle.

The Bengal Veterinary School has been raised to the status of a College which is under the management of a committee appointed by Government and consisting of Government officers and native gentlemen. The college consists of a large building in which are three lecture-rooms, a museum, library and reading-room, pharmacy, lecturers' room, and a photographic room. A Veterinary Hospital is attached to the College, consisting of four horse wards, *post mortem* and dissecting-room, shoeing-forge, operation, shed, and store-room. Special isolation wards for the contagious and infectious cases are provided outside the College compound, so as to prevent any chance of communication between the infectious and non-infectious cases. There is also a hostel attached to the College, which has been expressly provided for the benefit of the students of this College. It consists of eight large and three small rooms, with quarters for the Manager, and has sufficient accommodation for fifty boarders. Full clinical and other facilities will be afforded to meet the educational requirements of veterinary students in the Bengal Presidency. Students may also be admitted from any other part of India. The special objects of the College are to train thoroughly practical and competent men for veterinary service under Government, Native States, Municipalities, District Boards, and private employers. Government have undertaken to bear the cost of the establishment, which consists of a Principal, and assistant principal, three lecturers, an Hospital Surgeon, and a considerable working staff. Rules for the admission of students to, and regulation of their studies in, the Bengal Veterinary College, and for the admission of animals into the hospital of the Bengal Veterinary College, are issued provisionally, and are liable to be modified hereafter, if found necessary. It is a pity that Ceylon is so backward as regards veterinary education, which is more or less confined to a short theoretical course whih is of little benefit to the students attending it.

This procedure was adopted with successful results, and without any friction of any kind, but, as the outbreak was on the decline, the Bacteriologist was unable to make experiments on a large scale. In one village in which nearly a third of the cattle had died, twenty-four animals were treated ; a fortnight later none of them had been attacked, while out of thirty-nine healthy animals which had not been inoculated, seven had contractted the disease, and of these three died. In another village five were successfully inoculated ; but the disease was at the time on the decline, and their subsequent immunity from it may possibly be due to this cause. The experience gained in Bareilly is important, as indicating that with judicious explanation the villagers can be induced to consent to the experiments; and the Lieutenant-Governor desires that District Officers will in a similar way arrange to give assistance to the Bacteriologist when similar outbreaks occur. In this way inoculation against rinderpest may become in time so popular that the ordinary district veterinary staff may be able to practice it, to the great benefit of the people and the country.

At the Cape, the services of the Veterinary Surgeons are placed at the disposal of farmers and others. The following notification is worthy of being read and digested by our local authorities. As things go in Ceylon, the Colonial Veterinary Surgeon has first to get authority before he can visit the scene of some serious epizootic outbreak, while attendance on individual cases of serious non-contagious disease do not seem to come within the scope of that officer's duties :—

"Farmers and owners of stock throughout the Colony frequently telegraph to the Department of Agriculture requesting that one of the Government Veterinary Surgeons should be sent at once to them to attend to some valuable animal which has been taken seriously ill. It is rarely possible to comply with these requests; in the first place, because it is seldom that the Veterinary Officers can be communicated with immediately by telegraph, as they are generally engaged in the country at some distance from a telegraph station; and in the second place, because the only Veterinary Officer who may be at liberty to leave the work upon which he is engaged at the time, may be two or more hundred miles away, and can hardly be expected to arrive in time to be of any real service in an urgent case. Hence much valuable time is wasted, the owner of the animal is dissatisfied, and the Veterinary Staff discredited. It would be much more satisfactory, therefore, in all such cases in which veterinary advice and assistance are required, if the owner would telegraph the nature of the complaint that the animal is suffering from, giving as full and accurate description of the symptoms as possible. This

would enable the Veterinary Surgeon to telegraph advice at once, and state whether he were able to give personal attendance to the case or not, and thereby save valuable time, which is always of importance in acute and urgent cases."

ORIGIN AND FORMATION OF ORGANIC MATTER IN PLANTS.

(Continued.)

It does not suffice to know that the leaves, saturated with water, absorb the carbon dioxide of the air, and under the influence of the sun's rays evolve oxygen. It is necessary to define this process and to explain how organic matter is derived from the product of this decomposition. Maquenne and the author, in the article already referred to, report the result of studies on the quantities of carbon dioxide absorbed by leaves, taking into account also the quantities which would be absorbed by a volume of water equal to that contained in the leaves under experiment. The results, as already stated, indicated that the absorption is not simple solution of carbonic anhydride in the water of the leaves, but a chemical combination of the dioxide with water to form the acid CH_2O_3. This carbon dioxide decomposes in the leaves, giving off a volume of oxygen (O_2) equal to that of the carbonic anhydride absorbed as observed by Boussingault, and leaving a residue of formic aldehyde (CH_2O.) The fact that formic aldehyde has never been found in plants might be taken as casting doubt upon the correctness of the above hypothesis, but the hypothesis is strengthened by the fact that the molecules of this aldehyde combine easily with each other, and although we do not find formic aldehyde itself, we may safely assume that some at least of the bodies present are the result of combinations of molecules of formic aldehyde.

As a matter of fact, bodies which might be thus formed are extremely abundant in the vegetable kingdom, as will be seen hereafter. It is known also that the aldehydes combine readily with oxygen and hydrogen, and it is of great interest to ascertain whether there are not present in plants some products thus derived from formic aldehyde. As a matter of fact such substances have been found. By oxidation formic aldehyde yields formic acid, which gives to nettles their irritating properties. The addition of hydrogen to formic aldehyde in proper proportions yields methyl alcohol, which Maqueune found in all the plants which he studied. While the presence in plants of these two compounds so closely allied to formic aldehyde supports the hypothesis of the formation of this aldehyde in the chlorophyll cells at the moment of the decomposition of the carbon dioxide by the sun's rays, there are other proofs of a more convincing nature. The reducing sugars are widely distributed in plants. Loew, and later Fischer, starting with formic aldehyde, have prepared these sugars artificially.

They succeeded in linking together six formic aldehyde molecules, and thus formed a reducing sugar resembling those found in plants. This beautiful synthesis convinced the physiologists that the primary organic compound from which all the others are derived is formic aldehyde produced by the decomposition of the hydrated carbon dioxide. Many other compounds common in plants are formed by the combinations of molecules of formic aldehyde, such as glycerin, which exists in all oils and which contains three molecules of formic aldehyde combined with hydrogen; the gums, which readily yield a sugar containing five molecules of formic aldehyde; and persite, found in the fruit of the alligator pear which contains seven molecules of the aldehyde. Starch is easily transformed into glucose by simply heating the starch with weak acid solution. This in fact is the method employed in the commercial preparation of glucose. Starch is also transformed into glucose during germination by the action of a ferment present in the seed. This change is so easy and so frequent that there is no doubt that the transformation could be reversed; that is, the glucose could be changed into starch. Up to the present time, however, this has not been done by purely chemical means, but when leaves are placed in a solution of glucose, starch soon appears in them. The starch is formed from the glucose through the combination of several molecules of the latter, water being eliminated. Starch is very abundant in leaves which have been exposed to sunlight. Its presence is more easily detected than that of glucose. The latter is but a transition stage, while the starch is reserve material which remains in the tissues much longer than glucose. The starch which is so abundant at the end of the day disappears during the night. The leaf is thus seen to be both a laboratory and a store-house which is continually emptying and filling itself. The starch disappears from the leaves in the form of glucose. Adult plants utilise this transfer form of starch in the formation of cellulose, just as young plantlets utilise the glucose formed from starch in the cotyledons of the seed during germination. The different steps have now been traced in the formation of the organic matter of plants from the simple carbon dioxide absorbed to the complex carbohydrates of the plant tissues. It only remains to briefly discuss the derivation of some particular forms of these carbohydrates. Among the most important of these is cellulose, which forms the envelope of the cells and which is easily changed into reducing sugars under the action of acids. It appears during the germination of seeds simultaneously with the disappearance of starch. There is little doubt that it is derived from glucose, and consequently from formic aldehyde. It seems clear, therefore, that all the carbohydrates, the gums, sugars, starch, inulin, and cellulose originate in the activity of the chlorophyll cells. The same is probably true of the tannin and resin groups. There are, however, certain plants which contain a group of sugars known as the inosites, which are true carbohydrates, but whose molecular construction is different from that of the other glucoses, since their derivatives belong to the aromatic series and not to the fatty acid series, to which the other groups belong. There is one other important point which needs some explanation. If we study the phenomena of

assimilation in a leaf which has been exposed to sunlight, we shall find that the volume of oxygen evolved equals that of the carbonnic acid decomposed. The plant utilises the carbon, but the proportion of oxygen which it contains remains unchanged. This is not true, however. when we determine the changes in composition which the air in which a plant is living undergoes.

Schloesing found that under such conditions the volume of oxygen evolved was larger than the volume of carbon dioxide absorbed. This indicates that the evolution of oxygen is not due simply to decomposition of carbon dioxide. Doubtless the greater part of this excess of oxygen is due to reduction of nitrates which the plants take up from the soil, but, as is shown below, a study of plant respiration reveals another source of oxygen.

FIBRES.

(*Continued*).

[BY DR. CHAS. RICHARDS DODGE].

Turning to the Western World and to the aboriginal civilization of the Inkas, we find the ancient Peruvians, with their simple handlooms, were enabled to produce fabrics that were marvels of design and exquisite in color and finish. Both cotton and wool were used in the different articles of dress of these people with other fibres. The Aztecs, or ancient Mexicans, were familiar with cotton, as well as several other vegetable fibres. With cotton and feathers we are told they produced a soft and beautiful fabric, which was used for mantles and blankets, and examples of their plain cotton fabrics are said to have been as fine as some of the imported linen of the present age. Regarding the early use of cotton on this Continent, there are abundant records to show that it has been cultivated more or less generally for four or five centuries. How long it has been known to the early ancestors of some of the native Indian tribes of our own country will never be known, although from the fact that its use is required in religious ceremonials, as in the Hopi Indian tribe, for example, we may be sure that such use is no modern innovation. Among the ancient fibres of India, we have early allusions, in the Institutes of Menu, to several prominent fibres, particularly where the material of the sacrificial thread is prescribed. Cotton, sana, and woollen thread are mentioned. Sana has been supposed to refer to Sunn hemp, one of the commercial fibres of the present time (*Crotalaria juncea*). Dr. Watt says the possible Sana fibres of the Sanscrit authors were Sunn, above mentioned, Sanpat, or *Hibiscus cannabinus* and common hemp (*Cannabis sativa*). On the whole, the evidence is in favor of Sunn. Hemp grows wild throughout India, just as it is found in a wild state in many parts of our own country, but is regarded as the source of the drug known as bhang, or hasheesh, rather than as a fibre plant. We know that the use of hemp among the ancients was very limited. It has no mention in the Scriptures, and it is rarely referred to by the heathen writers of antiquity. It was used by the Scythians at least five hundred years before the Christian era, and some writers attribute to its cultivation an antiquity more remote by a thousand years; and it was known to the Chinese at a period quite as remote. The Romans were familiar with the use of hemp for sails and cordage, though not until after the dawn of the Christian era. The China grass fibre, more popularly known as ramie, has been grown in the Orient from time immemorial, and modern writers have attempted to prove that it was contemporaneous with flax several thousand years ago in Egypt, if indeed it was not used for mummy cloth. Dr. Watt also advances a suggestion regarding ramie which would give it a great antiquity in India. He states that frequent reference is made in the Ramagana to a garment called the kshauma, and goes on to say that while kshauma is generally regarded as a name for linen, the word strongly resembles the Chinese name of the grass-cloth plant, or ramie, which is Chuma, Schou-ma or as now most commonly written, Tehou-ma. The use of ramie fibre is undoubtedly old, but how ancient, history does not inform us. The date palm, as we know, afforded a valuable material for cordage in Egypt in very early times, as the modern excavations have revealed to us, and the fibre is valued quite as highly by the present inhabitants of the country; and the ancient Chaldeans, or Babylonians, are said to have used this palm for everything—food, clothing, wine, and the timber for their habitations. There is plenty of evidence that palm fibre was employed throughout this entire region of the ancient world. Pliny tells us that even the papyrus (*Cyprus papyrus*) was used for cordage in Egypt, as well as for matting, curtains, and sails, and Warden says that small boats were sometimes made from the plant. Ancient vessels of bulrushes are mentioned by Isaiah, and Lucan alludes to the manner of binding and sawing them with papyrus. The use of papyrus for paper is even more interesting.

In the realm of rank aquatic vegetation we may note a reed known as Arundodonax, which has been regarded as the "reed" of the Scriptures: "A bruised reed shall he not break, and the smoking flax shall he not quench." (The Hebrews employed flax for their lamp wicks.) Dr. Moore tells us that the heroes of Homer made their arrows of the Arundo (Iliad XI.), and that the tent of Achilles was thatched with its leaves. A coarse grass (*Spartium junceum*) has been used in Italy as a fibre plant from ancient times, its Italian name being Ginestra de Spagna. It is mentiond by Pliny. It was also largely used by the Greeks and Romans for many purposes. Another ancient Eyptian fibre grass is known as Teff (*Poa abyssinica*), said to have been the "straw" that was used by the ancient Egyptians in brick-making. The ancients were also familiar with the use of flexible twigs for tying material, the name viburna being used for such substances. Twigs of vibirnum cassinoides are used for such purposes in the present age. In the Western Hemisphere the fibre of two species at least of agave were employed by the ancient Mexicans or Aztecs, together with palm fibre and very coarse cotton, as clothing for the poorer classes. Cloth from the agave was called nequen, and today the Yucatan name of the commercial sisal hemp, or ag-ave rigida, is henequen. This may have been one of the ancient Mexican species, but as the history of

their civilization was grotesquely recorded by the use of idiographic paintings, and not by means of written language upon books or scrolls, such fine distinctions as botanical species are not possible Agave fibre was also used to a limited extent by the ancient Peruvians, though wool and cotton were held in first esteem. In the burial mounds of the south-western United States the remains of fibres are frequently found, Agave and Yucca fibre being common. Remains of bast fibres are also found, but they have not been identified. The subject is interesting, but it is not possible on these pages to give more than an outline, chiefly for the purpose of showing that the most valued of the commercial fibres of today were among the useful fibre species of the ancient world.

RINDERPEST.

D. Hutcheon, Colonial Veterinary Surgeon, Cape Colony.

(*Continued*.)

Pure fresh bile should not be used in an infected herd, if any of the other inoculating materials can be obtained, as it tends to intensify the character of the disease in those already infected, and its immunising effect is too slowly developed to protect the healthy cattle against infection, if they are left in contact with those already sick. If no other means are available, however, the temperatures of the whole of the cattle in the infected herd should be carefully taken by the clinical thermometer, and only those which register a normal temperature should be inoculated with pure bile, the others should be separated from the inoculated lot at once, and carefully tended. If glycerine be obtained, the spare bile should be mixed with it in the proper proportions—one part of glycerine to two parts of bile. This mixture, after standing forty-eight hours, may be injected into the affected animals in large doses not only with safety, but with marked benefit.

A similar line of treatment should be adopted where Rinderpest appears amongst a herd of cattle which has been previously inoculated with bile. Much will depend, however, upon the length of time whch has elapsed since the previous bile inoculation. In the large majority of instances that would now be nearly eighteen months, except in those herds in which it has for some special reason been repeated. Hence the amount of immunity remaining would in most instance be small, while in the remainder it would have practically passed off. It is impossible, at the present time, to form any estimate of the strength of the immunity which remains in any individual herd, as it varies so much. In some bile-inoculated herds all immunity appears to have passed off in a few months, while in others the immunity has been strong enough to resist natural infection after twelve months. As an example of the latter, Rinderpest appeard at Tafelberg Hall amongest the young calves which had not been inoculated, and four had died and several more were sick before the nature of the disease was discovered, or the affected animals removed from the rest of the herd. But although this occurred over thirteen months after the cattle were inoculated, the outbreak was confind to the calves; not a single previously inoculated animal contracted the infection. If such a herd had been re-inoculated with any kind of bile, pure or glycerinaned, or even with serum, the inoculation would have got the credit of arresting the progress of the disease at once, whereas it was eutirely due to the lasting immunity conferred by the previous bile inoculation. To quote an instance of an opposite character, the disease appeared in a herd of cattle on a farm near Molteno, about five months after being inoculated with Koch's bile. The owner inoculated all that were visibly sick with serum, but not in doses large enough to do any good, and the remainder he inoculated with pure bile, after Koch, with the result that the serum did not save any of the visibly affected cattle, aud the majority of those inoculated with bile, many of which would be already affected, also succumbed. In such a case if the whole herd had been inoculated with serum, giving large doses to all indicating the presence of fever, by a rise of temperature, and the usual doses to the others, the probability is that those which were bad at the time of inoculation would have died, but the others would have been protected. Similar results would have followed if the herd had been inoculated with glycerinated bile, for, as already remarked, glycerinated bile contains strongly curative as well as immunising properties. Veterinary Surgeon Armstrong discovered that fact as far back as September 1897. While in the district of Graaff-Reinet, Rinderpest appeared iu a herd of cattle unexpectedly, and he could not procure serum in time to be of any use, so he injected 20 c. c. of glycerinated bile direct into the jugular vein of the sick and apparently healthy alike, with marked beneficial effects; only one animal died out of the twenty-four treated. Since that date, the curative action of glycerinated bile has been repeatedly witnessed by farmers, as well as by different members of the Veterinary Staff. Its action in this respect is silimar to that of immunising serum, the strength of the antidotal action varying in different samples of bile.

the reason why glycerinated bile cau be injected into healthy animals with perfect safety, and into sick animals with marked beneficial results, whereas fresh pure bile frequently communicates the disease to healthy cattle on inoculation, and if it is injected into animals already infected, "shortens the period of incubation," and intensifies the attack—is explained as follows:—The addition of glycerine to the bile has the effect of destroying, or rendering inactive, the infective organisms of Rinderpest which are present in the bile, leaving the passive immunising substances uneffected. On the other hand, to quote Drs. J. W. and Otto C. H. Krause, *vide South African Medical Journal*, vol. vi., part 2, p. 29:—"Pure fresh bile contains the Rinderpest organism, but its activity is restrained by the presence of the immunising substances in the bile and by the bile salts." Further on these authors quote a conversation which one of them had with Dr. Koch respecting the way in which the bile of a Rinderpest animal acted. Prof. Koch's opinion is as follows:—"The bile is very gradually absorbed into the system of the animal, the minute doses of poison the system resisted forming a chemical protecting substance, which conferred a weak immunity, and which immunity

again increased as the further absorption of the remaining bile went on, until on or before the tenth day of gall inoculation the animal could withstand the enormous dose of 10 c.c. of virulent blood injected without contracting the disease. On the contrary, it was found that the injection of 10 c.c. of virulent blood fortified this immunity to a much higher degree. Bile is an aseptic fluid, which has the property when injected into the intercellular tissue of passing very slowly into the circulation. In some instances the absorption of bile takes place quicker than others, hence the gall acts with varying intensity. Thus in accordance with Prof. Koch's view, slow absorption of rinderpest bile confers immunity on an animal; quick absorption would cause rinderpest. This will depend on the amount of immunising substances in the gall; where these immunising substances are contained in the bile in the lesser quantities and not sufficient to modify or mitigate the action of the rinderpest organism, disease will supervene. Here, however, we meet with individual differences."

"Experience has taught us that, after bile inoculation of clean herds, several animals contract rinderpest from about the 8th day after the infection. The incubation period of rinderpest when acquired in the natural manner from infection through the mouth and nose, will vary depending upon the amount of poison entering the system. When an animal is infected by means of an injection of virulent blood this period is shorter; where a large dose (10 c.c.) is used the incubation period is mostly from 60 to 96 hours; when a smaller dose (0.2 c.c.) is injected, 6 to 7 days; and when a still smaller dose is employed, the period is longer. In an animal inoculated with serum after the French method, the incubation period is prolonged, and the disease appears between the 8th and 10th day, in some cases even at a later period. Where glycerinated bile (Edington's) is injected, which contains only the passive immunising substances, and after ten days 0·2 c.c. virulent blood, the incubation period is prolonged, and the animals in the majority of cases contract the disease on the 9th or 10th day after the blood injection, depending on the amount of immunising substances; where these substances in the glycerinated bile are too powerful, no outbreak of the disease will occur.

If, now, the animals had been infected on the day of inoculation with bile, in the natural manner the disease would appear on the 5th day. The outbreak taking place so regularly on the 8th day (after bile inoculation) "conclusively proves that no infection was conveyed to the animals at the time of inoculation, and must have been subsequently cnmmunicated to the animals by means of the rinderpest organism contained in the bile."

After adducing very strong evidence in favour of the fact that rinderpest bile does communicate the disease to healthy cattle, Drs. Krause propose, in order to minimise the loss arising from that, to give two inoculations instead of one. They say:—"To procure a long immunity, and at the same time to minimise the mortality after bile inoculation, we recommended two successive bile inoculations in the following manner, and obtained excellent results. The first inoculation was to be made with bile older than three days, and not older than seven. Twelve to fourteen days after this inoculation the second inoculation followed, on condition that the animals showed no signs of disease. We found further by experiment that it was safest to use for the first inoculation 8 c.c. and for the second inoculation 15 to 20 c.c. of bile. Should, however, some of the animals sicken this second inoculation was postponed to the 20th day."

Whilst I thoroughly agree with Drs. Krause in their opinion with respect to the capability of certain fresh biles, under favouring conditions, to communicate rinderpest to healthy cattle, and accept the explanation which they offer as probably being the correct one as to how this infection is effected by the bile, I differ from them as to the method in which they propose to overcome this drawback, and procure a long immunity with safety.

With respect to their recommendation to keep biles from three to seven days until their infective properties have passed off, this is impracticable for either a Veterinary Surgeon or a farmer situated in the country districts. Bile cannot be kept sweet and fit for use for that period without ice, and it is both difficult and expensive to obtained ice in districts some distance from a railway. But I cannot understand why, under the circumstances, Drs. Krause should not use glycerinated bile for the first inoculation when they admit that it possesses the same properties as pure bile which has been kept for four days and over. It is absolutely safe to use, and equally effective.

With regard to their recommendation to use only 8 c.c. instead of 10 c.c. of Koch's bile for a first inoculation,—if this applies to bile which has been kept for four days and over, I do not see any necessity or advantage in reducing the dose, because a full dose of bile of that age would be safe to use. And if it refers to comparatively fresh biles which have been kept from 24 to 48 hours, I regret to have to state that in our experience we did not find the small dose any safer than the large one. We tried the method of twice inoculating with bile as far back as the beginning of May 1897, but the results were not satisfactory. The disease appeared in the herds following inoculation with the smaller dose as frequently as when the full dose was used, it being the quality rather than the quantity of the bile to which we attributed this result: and when the disease did appear in a herd after being inoculated with the smaller dose, it showed a greater tendency to spread through the herd, as the immunity was not so strong as when the full dose of bile was injected at first; and if a second inoculation with pure bile was resorted to before the disease had ceased in the herd, it intensified the disease and increased the mortality, while to wait until the disease had ceased in the herd, was to wait until the second inoculation was of no immediate practical value except to extend the immunity. We had therefore to abandon that method and resort to the old dose of 10 c.c. for the first does, a second dose could then be injected at any convenient date if the owner wished to further fortify his cattle.

Moreover, it is very evident that the Drs. had no great confidence in the success of this small first injection of bile themselves, for they make provision for, and give directions how to act should the disease follow the first inoculation with 8 c.c.

But with glycerinated bile, the case is entirely different, it can with perfect safety be injected into healthy susceptible cattle in doses sufficiently large to give complete immunity against the danger of a second large dose of fresh pure bile communicating the disease. Considering, therefore, that Rinderpest has practically died out in the Colony, no farmer with a clean herd would willingly run the risk of introducing the disease amongest his cattle, if he could get them protected without the necessity of doing so. I have no hesitation, therefore, in reply to the question,—What method of inoculation should be adopted in the case of clean herds which are in danger? to recommend that they be at once inoculated with a large dose of glycerinated bile (from 20 to 30 c.c.) corresponding to the size of the animals, and follow this inoculation in from eight to twelve days with an injection of a large dose (10 to 20 c.c.) of strong pure bile. If this is properly carried out, such inoculated animals would have a lengthened immunity conferred upon them sufficient for all practical purposes.

With respect to Drs. Kranse's recommendation to follow these two bile inoculations with an injection of virulent blood,—there is no part of South Africa in which an injection of virulent blood after bile inoculation has been so largely practised as in Cape Colony, and our experience is that *one* dose of virulent blood injected on the tenth day after bile inoculation does not strengthen or extend the immunity conferred by the bile, if such bile possessed strong immunising properties and the blood inoculation that followed produced no fever reaction. If, on the other hand, the bile was weak in immunising properties, the mortality that followed the virulent blood inoculation was very high, in many cases 75 per cent. and even more.

In controverting our expressed opinion on this point Drs. Krause make a very important qualifying remark. They say "It is an established fact that once an animal is rendered immune, and *gradually infectious* materials are conveyed to its blood, the greater the increase of the immunity will be." Quite so; we never disputed that inoculation with virulent blood in *gradually increasing* doses, injected at short intervals after bile, will increase the immunity conferred by the bile. We emphasized this fact, *vide* my annual report for 1897, p. 25. The point that we disputed and still maintain is that if *one dose* of virulent blood is injected into an animal ten days after that animal was inoculated with Koch's bile, when the latter confers an immunity which resists the action of the dose of virulent blood so copletely that no reaction follows, then the immunity of that animal is not perceptibly strengthened by such an inoculation with virulent blood. I do not think that any one who reads the account of our experiment at Taaiboschfontein in the Herbert district in 1897 can entertain any doubt on that point, *vide* my annual report for 1897, p. 14.

But apart from its utility or otherwise, there are very few farmers in the Cape Colony who would now favour the blood inoculation after bile in healthy herds owing (a) to the danger of introducing active rinderpest amongst them, and (b) the danger of introducing other diseases such as red-water by the blood inoculation.

These are also the chief reasons why the serum and blood method of inoculation should not be applied to healthy herds,in the majority of the cattle districts of the Colony, at least not unless the disease should again assume an epizootic form, which we sincerely hope it my not. But independent of the undesirability of introducing the disease into clean herds now that it has become sporadic in its character, it will be impossible to obtain any strong serum after our present limited supply is exhausted, as there will be no suitable animals available for its immediate production. As Dr. Turner remarks, "such highly fortified animals as would produced strong immunising serum could not be prepared in less than three months. Hence bile must of necessity be used for th inoculation of herds in fresh outbreaks of an isolated and sporadic character." I would therefore strongly recommend that in every outbreak of the disease that occurs, every drop of suitable bile obtained from the animals which die should be mixed with glycerine in proper proportions, two parts of bile to one of glycerine, so that it may be preserved and made available for the inoculation of infected herds, and also for the first inoculation of clean herds which may be considered in danger. Pure bile for the second inoculation of clean herds can always be obtained when the disease appears in any locality, which would be the only reason for inoculating clean herds in the immediate vicinity. The method of inoculation which I would recommend in future sporadic outbreaks of the disease is briefly as follows:—

Infected Herds.—These should be inoculated at once with either serum or glycerinated bile; every animal which indicates infection by a rise of temperature should receive a large dose of not less than 100 cc. of serum, or 30 cc. of glycerinated bile, the latter should by preference be injected into the jugular vein, so as to secure its immediate action. Then from eight to twelve days after, all the animals in the herds which give no indication of being infected with the disease or fever should receive an injection of pure bile; not less than 10 cc., and for large animals 20 cc. This will confer a lasting immunity sufficient for all practical purposes.

Clean Herds.—When it is decided to inoculate a clean herd which is in danger of becoming infected through its proximity to diseased cattle, I would recommend that the animals composing the herd should be inoculated first with 20 cc. of glycerinated bile, and to follow this inoculation in from eight to twelve days with an injection of from 10 to 20 cc. of pure bile. This will confer a strong and lasting immunity on the animals in the herd, and will be free from risk arising from the inoculation or of introducing the disease.

DIRECTIONS FOR PREPARING THE BILE.

The bile should be taken from an affected animal immediately after death, or from one which is killed in the last stage of collapse.

Biles of all shades of colour—except those which are red from the presence of blood—may be

used, so long as they are clear and free from a putrid smell. Thin, light, yellow biles should also be rejected.

All the galls extracted at one time should be mixed together, after standing separately for twelve to eighteen hours, so as to render them uniform in streugth and immunising properties. Pure bile should be used on the second day after being drawn, unless it is kept in an ice chest, when it may be kept sweet much longer. But if pure bile is used as a second inoculation only as above directed, it is not desirable to keep it longer than twenty-four hours.

Glycerinated bile is made by adding one part of glycerine to two parts of bile, stirring the mixture well, then mix all the biles taken at one time, and allow them to stand for eight days. But if there is urgency, the glycerinated bile may be used forty-eight hours after it is mixed.

Cleanliness and all antiseptic precautions formerly published, aud with which the public are familiar, must be carried out in extractinle the bile and inoculating the catte.

TAGASASTE.

Very full information respecting the useful fodder plant known iu the Canary Islands as Tagasaste has been given in the Kew Reports, 1879, p. 18; 1880, p. 16; 1881, p. 13; 1882, p. 22, and in the Kew Bulletin 1891, p. 239. This plant was brought into notice by the late Dr. Victor Perez of Orotava, Teneriffe, and it was entirely through the personal exertions of this estimable geutleman that so much information has been obtained respecting it, and that seed of so useful a plant has been placed at the disposal of persons in various parts of the world for experimental purposes. Dr. Perez sent many supplies direct to Kew with results that have already been recorded. During a visit to Teneriffe in the early part of this year I had many opportuuities of seeing the Tagasaste growing and of realising how valuable it proved in dry localities unsuited to the growth of any other kind of herbage plant. This note is to be regarded as supplementing iu a few particulars the general information already given in the Kew Bulletin. The ordinary *Cytisus proliferus*, Linn. f., or "Silky Cytisus" is a plant widely distributed in Teneriffe. It is kuown locally as "Escabou." It was observed growing plentifully at elevations of 3,000 to 6,000 feet. According to specimens in the Kew Herbarium it is found also in Grand Canary, but probably to a much less extent thau in Teneriffe. It is not infrequently seen as a cultivated plant in English greenhouses where its silky leaves and abundant white flowers render it a very attractive object. In Teneriffe it forms a large bush or tree with a stout woody stem sometimes attaining a height of 8 to 10 feet. The branches are of a slender drooping habit plentifully covered with ternate leaves on short petioles. The leaflets are oval-lanceolate pointed at both ends and clothed on the underside by copious silky adpressed hairs. These hairs are generally white, but in some cases they are fuloons or even of a rich brown colour. The flowers (also silky in bud), are snow white when fully expanded and attached in loosely packed umbels on the sides of the branches. The pedicels are of a rosy colour. After flowering the bud in the centre of each umbel usually grows out into a branch, an appearance of proliferation which has suggested the specific name. The pods are slightly narrowed at the base and produced abundantly. They are sismous, oblong pointed and densely pilose in the young state. This is the typical plant known as "Escabon," ordinarily met with in the mountanious parts in Teneriffe. There are several forms differing slightly in the size of the leaves and the colours of the flowers.

None of them, however, possess any special merit as fodder plants. The Escabon itself is seldom browsed upon by animals unless pressed by hunger, and it probably contains cytisine—an active poisonous principle known to exist in the common laburnum and other members of this genus. The tagasaste on the other haud evidently contains little cytisine, for it is readily eaten by animals and especially those that have become accustomed to it when young. The tagasaste is known in the wild state only from the island of Palma where it grew originally on the hills above the celebrated chapel of our Lady de las Nieves at an elevation of about 1,000 feet above the level of the sea. It acquired considerable reputation locally, and it was gradually distributed by cultivation all over Palma. The first person who carefully studied the tagasaste and wrote about it was Dr. Victor Perez. He introduced it into cultivatiou at Teueriffe and published a pamphlet on its merits as a fodder plant nearly 30 years ago. The plant was quoted in Dr. Victor Perez's writings simply as an unnamed variety of *Cytisus proliferus*. Although in botanical characters it differs only in a slight degree from the type, it has nevertheless deserved to be regarded as a distinct variety and to bear a distinguishing name. The name that might very appropriately have been associated with it was that of Dr. Victor Perez. As the matter now stands, however, the tagasaste has been described by Dr. H. Christ in *Spicilegium Canariense* published in Engler's "Botanishe Jahrbuches," IX. 120, as *Cytisus proliferus var. palmensis*. This name therefore distiuguishes the Palma Tagasaste from the ordinary Teneriffe plant Escabon. *Cytisus proliferus*, Linn., *f. var. palmensis* differs from the type by its more robust growth and a laxer habit. It often attains a height of 12 to 15 feet in good soils, and all parts of the stem and branches are enveloped in leaves. In fact its very leafy character is oue of the marked features of the plant. The leaflets are ovate oblong, somewhat obtuse and dark green in colour. The young growths, as may be seeu in growing specimens at Kew, are almost entirely destitute of the silky hairs so abundant on the species. Dr. Christ's Palma specimens were obtained on the margin of woods above Barranco Carmen and at Dolores in March 1884. It only remains to add a few words respecting the economic value and the uses of tagasaste for fodder purposes. Like all Canary plants it sends its very long tap roots deep into the ground, and it is thus enabled to bear prolonged periods of drought without injury. In many instances tagasaste was the only plant that throve in loose volcanic scoria and ash. Bushes of it more than

20 years old, existing under the most arid conditions were still yielding regularly large crops of fodder. A plant or two is cultivated near every cottage in the neighbourhood of Orotava, and it is planted along the principal roads to afford food for the animals kept by the road labourers.

The tagasaste evidently prefers a loose friable soil, for then its roots can penetrate far into the earth. It grows moderately well also in somewhat clayey soils, but it is impatient of stagnant moisture. The climate where the tagasaste thrives best is mild and equable. The plant is well known not to bear frost, but on the other hand, it will probably bear considerable heat, and it might on this account be suited for most tropical and sub-tropical countries with a friable soil. As already stated the tagasaste is readily eaten by domestic animals. Cattle, sheep, goats, and pigs evidently thrive upon it. It is said not to be so suitable for horses in the green state. This practically the only drawback to its general use when freshly cut. It makes, however, an excellent hay, and as a dry fodder or after being treated in silos its value is greatly increased. A sample of dried fermented tagasaste was forwarded to Kew by Dr. Perez through Her Majesty's Consul at Teneriffe in 1886. It is said that in this state tagasaste is particularly palatable to both horses and ruminants. Another interesting point about tagasaste is that its flowers are frequented by swarms of bees, and it has already proved at the Cape and in Australia of great value to bee-keepers. The late Dr. Schombugk states that the tagasaste trees in the Botanic Garden at Adelaide "were covered with bees during the flowering season." In countries with bare hilly tracts denuded of forest tagasaste should prove of the utmost value. It requires no irrigation, and once it is planted it lasts for 20 years or more. When overgrown and cut down it yields excellent firewood. In very dry countries with light friable soils there is probably no plant that would so well repay cultivation as the tagasaste.

GENERAL ITEMS.

The Mangosteen is a native of Malacca (Straits Settlements) it is said that in the early days of the French occupation of Cochin. China several naval officers who had been invited to the table of the Emperor Napoleon III. were unceasing in their praise of the delicious mangosteen, at that time unknown in Europe. The curiosity of Her Majesty the Empress Eugenie was aroused, and, wishing to taste for herself this famous produce of Cochin China, she requested an Admiral to accomplish the impossible and to procure for her at least a dozen mangosteens. Great efforts were made, the ice-room of a man-of-war taking troops home was appropriated to the purpose, and out of several thousands of the selected fruit a hundred arrived in good condition.

The Rev. W. H. Hollister, of Kolar, in the Mysore province, has says the *Indian Agriculturist*, sent us a small pamphlet in which he discusses the "plough problem," and hopes that his endeavours "will lead men of influence to adequate consideration of one of India's great needs." In the author's opinion a good plough costing Rs. 15 to Rs. 20 will pay for itself in two years and then be good for ten years' service, and a good plough drawn twenty-five miles will accomplish as much as a country plough drawn 100 miles. Mr. Hollister then discusses the relative advantages of the improved and country ploughs and lays down the following propositions: Improved ploughs are an important factor in promoting general prosperity and preventing famine in India, for they will largely increase the productive areas, besides increasing the production of present cultivated areas by bringing unused portions under actual cultivation, by destroying noxious weeds and grasses that cause many acres to lie waste or produce scant crops, and by improving the soil in many places. Other advantages claimed by the author for the improved plough are that the use of it will lead to improvement in the quality of the cattle and will help directly in solving some famine problems. Mr. Hollister, proceeding to discuss what should be the attitude of Government in this matter, makes some very sensible remarks. He says that Government action in this matter would be in perfect accord with its generous, humane, and paternal efforts for the people on other lines, and it is as legitimate a line for Government effort as are irrigation works. As to the efforts that Government may wisely make in this matter, the following are some of the suggestions of the author of the pamphlet. (*a*) Let careful and exhaustive tests be made of all ploughs that appear likely to be of real value to ryots. The more meritorious should be brought to the notice of the people and be placed within reach of the more intelligent ryot, since these will use them to their best advantage; (*b*) men of practical experience in agriculture and the use of ploughs should be appointed Superintendents of circles of greater or less extent; (*c*) during the infancy of the industry Government should manufacture ploughs in such a manner as to reduce their cost to a minimum; (*d*) Government should establish numerous depots.